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Montana Environmental Trust Group

Montana Environmental Trust Group, LLC
Trustee of the Montana Environmental Custodial Trust
PO Box 1230, East Helena, Montana 59635
Telephone (1): (617) 448-9762
Telephone (2): (406) 227-4098

By Electronic Mail and Hand Delivery

February 12, 2013

Betsy Burns
RCRA Project Officer
USEPA Region 8, Montana Operations Office
Federal Building
10 West 15th St., Suite 3200, Mail Code: 8MO
Helena, MT 59626

Dear Betsy:

The Montana Environmental Trust Group, LLC, Trustee of the Montana Environmental Custodial Trust (the Custodial Trust), respectfully submits the attached, *"Former ASARCO East Helena Facility Interim Measures Work Plan—2013 (Final),"* (the IM Work Plan 2013) to the US Environmental Protection Agency (EPA), as Lead Agency for East Helena Site. The Final IM Work Plan 2013 was prepared in accordance with EPA's conditional approval letter of January 31, 2013 and the Custodial Trust's obligations under the Consent Decree and Environmental Settlement Agreement Regarding the Montana Sites and the First Modification to the 1998 Consent Decree (Civil Action No. CV 98-3-H-CCL, US Federal District Court, District of MT). The Final IM Work Plan 2013 is available in electronic form on the Custodial Trust website (http://www.mtenvironmentaltrust.org/).

Please do not hesitate to contact me with any questions pertaining to this transmittal.

Sincerely,

Cynthia Brooks

Montana Environmental Trust Group, LLC
Trustee of the Montana Environmental Custodial Trust
By: Greenfield Environmental Trust Group, Inc., Member
By: Cynthia Brooks, President

Attachments

cc: With Attachments

Randy Breeden—US EPA-8
Rob Collins—MDOJ
Jim Ford—Custodial Trust
Denise Kirkpatrick—MDEQ
East Helena Branch of the Lewis & Clark County Library
City of East Helena—Office of the Mayor

cc: Without Attachments

Mary Capdeville—MDOJ
Julie DalSoglio—US EPA-8
Chuck Figur—USEPA-8
Doug Martin—MDOJ
Greg Mullen—MDOJ
Karen Nelson—USFWS
Alan Tenenbaum—USDOJ
Elliot Rockler—USDOJ
Joe Vranka—US EPA-8
Marc Weinreich—Custodial Trust

FINAL

Former ASARCO East Helena Facility Interim Measures Work Plan—2013

Prepared for

The Montana Environmental Trust Group, LLC Trustee of the Montana Environmental Custodial Trust

February 2013

CH2MHILL®

7 West 6th Avenue Suite 519
Helena, Montana 59601

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Acronyms and Abbreviations

ACM	asbestos-containing material
AMSL	above mean sea level
AOC	Area of Contamination
bgs	below ground surface
CAMU	Corrective Action Management Unit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
CLOMR	Conditional Letter of Map Revision
COPC	constituent of potential concern
CSHB	Concentrate Storage and Handling Building
CSM	conceptual site model
Custodial Trust	Montana Environmental Custodial Trust
CWA	Clean Water Act
DNRC	(Montana) Department of Natural Resources and Conservation
ERM	Environmentally Regulated Material
ESD	Explanations of Significant Differences
ET	evapotranspiration
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FSAP	Field Sampling and Analysis Plan
ft^3/s	cubic feet per second
GSI	GSI Water Solutions, Inc.
GW	groundwater
H&S	health and safety
HDS	high-density sludge
HEC-RAS	Hydrologic Engineering Centers River Analysis System
HELP	Hydraulic Evaluation of Landfill Performance
IM	interim measure
LOMR	Letter of Map Revision
LOSA	Lower Ore Storage Area
MBTA	Migratory Bird Treaty Act
MCL	maximum contaminant level
MDEQ	Montana Department of Environmental Quality

MDT	Montana Department of Transportation
mg/kg	milligram(s) per kilogram
mg/L	milligram(s) per liter
MPDES	Montana Pollutant Discharge Elimination System
MTSMP	Montana Stream Mitigation Procedure
NWP	Nationwide Permit
OSHB	Ore Storage and Handling Building
OU	Operable Unit
PCB	polychlorinated biphenyl
P.E.	Professional Engineer
PPC	Prickly Pear Creek
ppm	parts per million
PTS	Pioneer Technical Services
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
ROD	Record of Decision
SLV	screening-level value
SPHC	South Plant Hydraulic Control
SSL	Soil Screening Level
SWPPP	Stormwater Pollution Prevention Plan
TSCA	Toxic Substances Control Act
U.S.	United States
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
yd^3	cubic yard(s)

SECTION 1

Introduction

The purpose of this Interim Measures Work Plan 2013 (IM Work Plan 2013) is to provide information to support U.S. Environmental Protection Agency (USEPA) approval of the interim measures (IMs) phases proposed for implementation in 2013 at the East Helena Facility (Facility). This IM Work Plan 2013 focuses on work proposed for 2013 and, as appropriate, provides updates to information that was presented in the Interim Measures Work Plan 2012 (IM Work Plan 2012; CH2M HILL, 2012a).

Three IMs were proposed in concept in the IM Work Plan 2012, and subsequently conceptually approved by USEPA on August 28, 2012. The primary purpose of the IMs is to reduce the migration of contaminants in groundwater from the former Smelter site and contribute to the protection of public health and the environment. The three IMs are summarized as follows:

- The South Plant Hydraulic Control IM (SPHC IM), proposed to reduce the migration of inorganic contaminants in groundwater by changing the hydraulics at the south end of the former Smelter site.
- The Source Removal IM, proposed to reduce the mass loading of contaminants to groundwater by reducing the volume of soils with high concentrations of inorganic contaminants that are in direct contact with, and leaching contaminants to, groundwater.
- The Evapotranspiration Cover System IM (ET Cover System IM), which will join with the other two IMs to further reduce the potential for inorganic soil contaminants leaching to groundwater by eliminating or substantially reducing the amount of precipitation that infiltrates through contaminated materials. The ET Cover System IM will also eliminate human and ecological receptor exposure to inorganic-contaminated soils.

Each of the three IMs will be implemented in phases over a number of years. The following phases are proposed for 2013 and presented herein for USEPA review and approval as well as public review and comment:

- ET Cover System IM: Phase 2 demolition of the buildings and infrastructure on the former Smelter site. Required for implementation of the ET Cover System.
- SPHC IM: Construction of the Temporary Bypass for Prickly Pear Creek (PPC). Required to realign PPC and contribute to lowering groundwater elevations as part of the SPHC IM.

The need for construction of a third CAMU (CAMU 3) is being considered in 2013 as part of the Source Removal IM. The need for and design details of CAMU 3 will be evaluated in part based on the nature and volume of remediation waste associated with the Source Removal IM. The scope of potential removal actions is currently being evaluated along with information being developed for the ET Cover System and SPHC IMs. If CAMU 3 is proposed for construction in 2013, all information required in 40 *Code of Federal Regulations* (CFR) 264.552 will be presented in a separate technical report to support USEPA's formal approval and designation of CAMU 3, with an opportunity for public review and comment. Additional information on the current source removal evaluations is provided in Section 2 of this IM Work Plan 2013, as well as the information on the proposed CAMU 3 location, as described in USEPA's response to public comment on the IM Work Plan 2012.

Figure 1-1 shows the work proposed for implementation in 2013.

The Montana Environmental Trust Group, LLC, Trustee of the Montana Environmental Custodial Trust (the Custodial Trust), is submitting this IM Work Plan 2013 in compliance with Paragraph 14 of the First Modification to the 1998 Resource Conservation and Recovery Act (RCRA) Consent Decree (First Modification, 2012) for the Facility.

This IM Work Plan 2013 builds on information presented in previous work plans, reports, and technical memoranda prepared by the Custodial Trust, including the IM Work Plan 2012. A complete list of references is provided in Section 9.

The Work Plan is organized into the following sections:

- **Section 1: Introduction**.
- **Section 2: Overview of 2013 Interim Measures Implementation** provides a general description of each phase of the IMs proposed for implementation in 2013 and describes how they fit into the overall IM concept for the former Smelter site.
- **Section 3: Updated Conceptual Site Model** presents an updated conceptual site model (CSM) for the former Smelter site with a focus on the Lower Ore Storage Area (LOSA) Sites and the East Bench, the primary areas associated with the 2013 IMs.
- **Section 4: Data Sufficiency** summarizes the existing data used in the development of the work proposed for 2013, determines whether additional data are needed to complete the design, and outlines the activities necessary to obtain additional data if necessary.
- **Section 5: Engineering Design and Construction Information for Proposed 2013 Projects** provides conceptual design information and outlines construction contracting and implementation considerations for the Phase 2 demolition and PPC Temporary Bypass construction proposed for 2013.
- **Section 6: Remediation Waste Management** describes how hazardous and nonhazardous remediation waste will be managed during 2013 IM implementation to meet the RCRA definitions of both remediation and CAMU-eligible waste.
- **Section 7: Status of Permitting Activities and Approvals** provides an update to relevant activities associated with the permitting and licensing measures described in the IM Work Plan 2012.
- **Section 8: Project Management and Schedule** provides an overview of project management activities and the proposed schedule for IM implementation. Organizational structure, lines of communication, public participation, deliverables and reporting, and the schedule are described in this section.
- **Section 9: References** provides a bibliography of documents cited in text.

Supporting information is provided in two appendixes. **Appendix A** contains a technical memorandum summarizing the results of the SPHC IM Upper Lake Drawdown Test methods and results. A preliminary summary of available testing results was included with the IM Work Plan 2012, and Appendix A provides an update and additional information. **Appendix B** contains soil data from the East Bench investigations conducted to date. **Appendix C** contains a preliminary list of PPC Temporary Bypass bid package specifications. **Appendix D** contains public comments received on the IM Work Plan 2013 with USEPA responses.

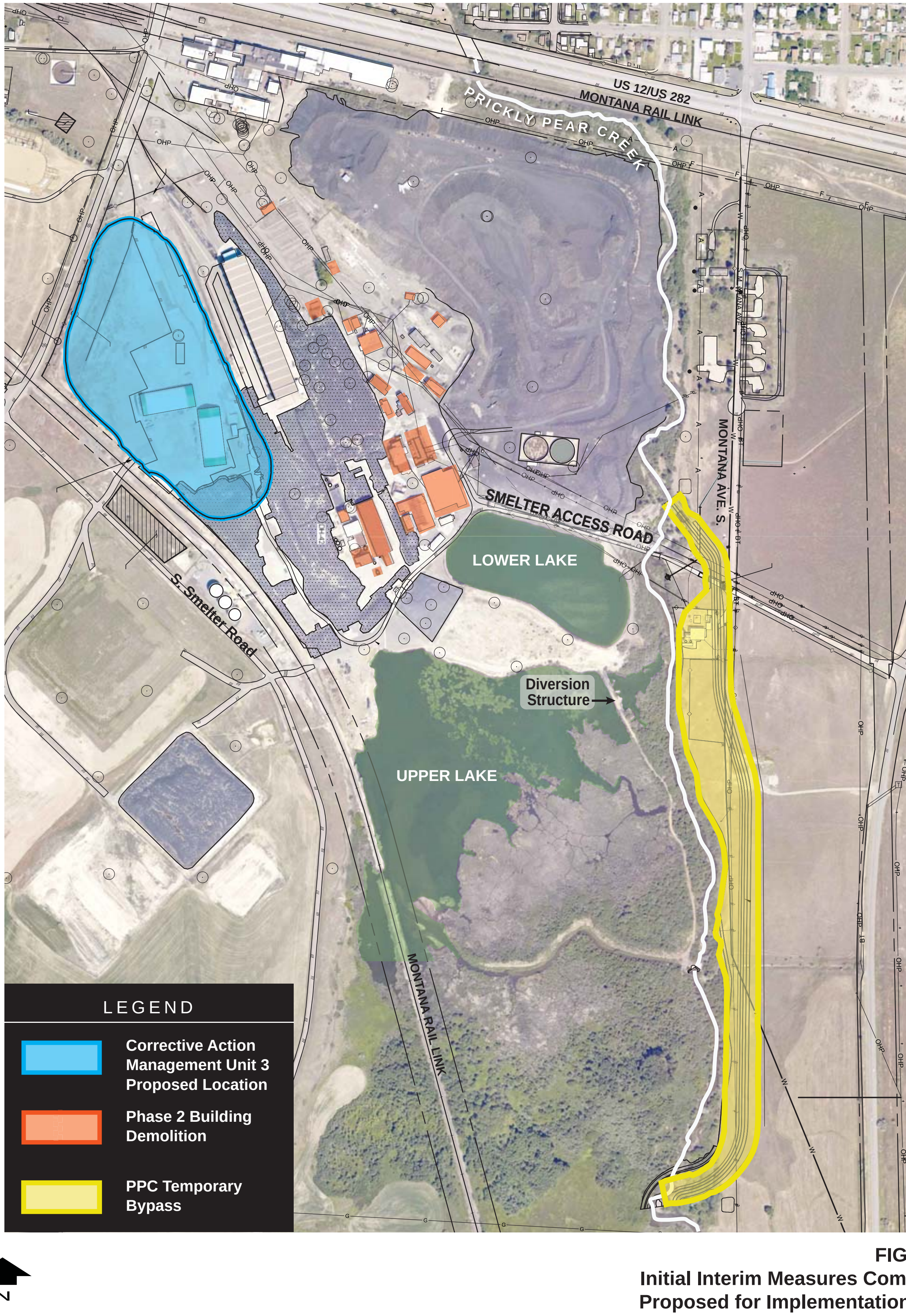

FIGURE 1-1
Initial Interim Measures Components Proposed for Implementation in 2013
Interim Measures Work Plan–2013
East Helena, Montana

SECTION 2

Overview of 2013 Interim Measures Implementation

This section provides an overview of the Phase 2 demolition and PPC Temporary Bypass construction proposed for 2013, and briefly describes how each phase fits into the overall IM concept for the former Smelter site. Additional information and engineering details for these two IM phases is provided in Section 5. This section also provides an update on current Source Removal IM evaluations and information regarding the proposed location for CAMU 3.

2.1 Phase 2 Demolition

2.1.1 Objective

The objective of the demolition work is to remove physical obstacles and prepare the site for IM and final remedy implementation. Phase 2 demolition focuses on the buildings and infrastructure within the footprint of Phases 2 and 3 of the ET Cover System IM.

2.1.2 Description

Demolition is planned to proceed in four phases. Figure 2-1 illustrates the areas of the former Smelter site associated with each phase. The phases are summarized as follows:

- Contractor preparation activities for the Phase 1 demolition were started in January of 2013, with field activities scheduled to begin in April. Phase 1 will focus largely on removing structures in the LOSA. These structures will include the Ore Storage and Handling Building (OSHB), Barnum and Bailey, and High Grade buildings as well as loading dock, truck scales, rails, and utilities in the area (both overhead and subsurface).
- Phase 2 (proposed herein for implementation in 2013) will include demolition of all remaining structures at the site not necessary for controlling, containing, treating, and discharging of stormwater. Phase 2 demolition will be conducted based on ground surface elevation (starting from high elevation to low) to protect existing stormwater controls, and will utilize some of the existing stormwater infrastructure during the demolition process. Utility lines encountered during Phase 1 and Phase 2 will be removed or abandoned (and capped or plugged as necessary).
- Phase 3 (planned to occur in 2014) will include demolition of select sumps in preparation for the Phase 1 ET Cover. The Phase 1 ET Cover will include most of the watershed draining to the Rodeo Tank and so will provide a significant reduction in stormwater flow going to treatment at the high-density sludge (HDS) water treatment plant. The Thornock Tank drainage basin is anticipated to remain operational during this period and so will require temporary power, along with the HDS plant, and any stormwater sumps that pump to the tank. Additionally, decommissioning of Wilson Ditch at the current point of diversion at Upper Lake (Figure 2-1), and relocation of the downstream water rights to an alternate point of diversion, will occur during Phase 3.
- Phase 4 (expected to occur in 2015) will include upgrading or establishing a replacement for the HDS plant, plant set up and operational optimization prior to the beginning of demolition. The treatment system will be evaluated and engineered in 2013. Demolition during this final phase will address the facilities and infrastructure that will be needed to manage stormwater until the ET Cover System is in place, such as the HDS water treatment Plant, and the remaining sumps and tanks of the Thornock drainage basin. Demolition of the Rodeo tank, acid tanks, and two 1 million gallon tanks (tank farm) (all outside of the ET Cover area) will be performed after the Phase 3 ET Cover is complete.

2.1.3 Technical Evaluations

Several studies were conducted as part of the planning and design of the Phase 2 demolition to ensure that work will be done in a protective and efficient manner. These studies included evaluations to:

- Identify hazardous and Environmentally Regulated Material (ERM) requiring special handling and disposal. The results of this work are summarized in Section 4.

- Identify types and locations of utilities.
- Ensure that (1) stormwater will be managed appropriately within the Phase 2 demolition area, and (2) infrastructure necessary to continue to collect and manage stormwater across the former Smelter site is maintained.
- Identify the nesting season of migratory birds in the work areas, in order to comply with direction from US Fish and Wildlife Service (USFWS) regarding application of the Migratory Bird Treaty Act (MBTA) and avoid disturbing the nests during the nesting season.

Additional information regarding the incorporation of the evaluation results into the design and construction of Phase 2 demolition is outlined in Section 5 of the IM Work Plan 2013. Phase 3 and Phase 4 demolition will be described in detail in future IM Work Plans for USEPA review and approval and public review and comment.

2.2 Source Removal IM Evaluations and Corrective Action Management Unit 3

2.2.1 Objective

The objective of the Source Removal IM is to remove soils and sediments that present a significant ongoing source of contamination to groundwater. The objective in constructing a third CAMU would be to add capacity for onsite management of remediation waste associated with source removal actions. The existing CAMU 1 has been closed, and the remaining capacity in CAMU 2 is approximately 50,000 CY. The scope, estimated level of protection and environmental benefit, and cost of potential removal actions are currently being evaluated. Final decisions regarding CAMU 3 will be based on the results of these analyses.

2.2.2 Description

The initial focus of the Source Removal IM has been to excavate some of the more highly contaminated soils in Tito Park and Lower Lake sediments. These materials were originally identified for removal by the CERCLA program in USEPA's Record of Decision (ROD) for Operable Unit (OU) 1 (OU-1 ROD; USEPA, 1989) and the 1993 Explanations of Significant Differences (ESD), which modified the OU-1 ROD to reduce the required depth of Lower Lake sediment removal from 2 feet to 6 inches, based on information submitted by ASARCO Incorporated (ASARCO). In the document titled *January 2011 Update, East Helena Superfund Site, East Helena, Montana (Five-Year Review date: 3/31/2006)*, USEPA indicated that these CERCLA removal actions would be "…assessed and remediated, as appropriate, during the RCRA Corrective Action process." Because these initial decisions were based on information that is now over 20 years old, additional evaluations of the protectiveness provided by source removal actions for these and other areas of the former Smelter site are currently underway using the most recent data available, including data summarized in the draft *Phase II RCRA Facility Investigation Report* (draft Phase II RFI Report; GSI Water Solutions, Inc. [GSI], 2011). These evaluations will include an estimate of the incremental environmental benefit along with estimated costs of the action, and are described briefly below. These excavated materials could be consolidated within the Area of Contamination (AOC) approved by USEPA as part of the IM Work Plan 2012 approval on August 28, 2012, or managed in a CAMU. If evaluations determine a CAMU is necessary, a third CAMU would be constructed to provide sufficient capacity for CAMU-eligible materials.

The proposed location of CAMU 3 is the area of the former Smelter site referred to as the Lower Ore Storage Area (LOSA), as shown in Figure 2-2. The current 60 percent design of CAMU 3 has a capacity of 495,000 cubic yards (yd^3) to manage the volume of remediation waste associated with excavation of Lower Lake sediments, Tito Park soils, and soils from portions of the Acid Plant area. A CAMU of this capacity would cover a little over 13 acres, and when closed would have a top elevation of 3,970 (which is approximately 40 feet higher than the current ground surface in this area).

2.2.3 Technical Evaluations

The Tito Park soils and Lower Lake sediment removal actions were originally identified by USEPA over 20 years ago, with the most recent ESD issued in 1993. The need for and scope of these actions assumed Smelter operations would continue and were based on other information available at that time. Significant changes have occurred since 1993 and the need for removal actions originally identified in the CERCLA OU-1 ROD is currently being reevaluated by the Custodial Trust, based on current information and data. Evaluations will include consideration of the fact that operations are no longer occurring, a slurry wall and cap were constructed in 2006 by ASARCO to contain some of the more highly contaminated soils in the former Acid Plant Sediment Drying area, and that there is additional data available on environmental quality and the effects of the proposed SPHC IM on the south plant area.

In addition to reviewing the Tito Park and Lower Lake removal actions, the need for and feasibility of removal actions at other areas of the former Smelter site are also being evaluated. These evaluations will be based on conceptual site models which are being developed using the data presented in the draft Phase II RFI Report and any other recent, relevant data (e.g. groundwater monitoring data, etc). Potential changes considered will include projected groundwater elevation changes resulting from the SPHC IM, as well as the expected performance of the ET Cover System. The ET Cover System will effectively control infiltration through contaminated soils in the vadose zone, thereby eliminating the potential for contaminant mass to leach to groundwater.

Several technical evaluations are also underway to develop information for use in the potential final design of CAMU 3, and include:

- The source removal evaluations noted above
- Geotechnical studies conducted to evaluate the suitability of using onsite materials and materials excavated during construction of the PPC Temporary Bypass, and to determine the design details necessary to ensure stability of CAMU side and berm slopes
- USEPA’s Hydraulic Evaluation of Landfill Performance (HELP) model to evaluate the expected performance of the liner and leachate collection system design, which provided predictions of the amount of leachate expected to be generated by the waste and climate and information used to size the pipes, perforations, sump, and pipes that will convey the leachate

2.2.4 Proposed CAMU 3 Location

The proposed location of CAMU 3 is in the LOSA area of the former Smelter site, as shown in Figure 2-2. This location meets all regulatory requirements for CAMUs, reduces the overall footprint of contamination at the Facility, and manages remediation waste protectively and cost-effectively during remedy implementation and into the future. The basis for selection of this location is described further in the following subsections, and additional technical details will be provided to USEPA under separate cover, as part of the documentation that would be provided to support USEPA’s review and designation of the CAMU.

2.2.4.1 Regulatory Requirements and Considerations

The January 22, 2002, Amendments to the Corrective Action Management Unit Rule; Final Rule, (the Final CAMU Rule) issued by USEPA specifies the requirements for construction, operation, closure, and post-closure care of a CAMU. The proposed CAMU 3 location will meet the siting requirement specified in 40 CFR 264.552(a), which states that a CAMU must be located within the contiguous property under the control of the owner or operator. Figure 2-2 shows that the CAMU is entirely within the Custodial Trust property boundary.

The Final CAMU Rule does not specify standards for the physical site conditions (e.g., geology, stratigraphy) of the proposed location. Instead, USEPA specifies the minimum design standards (cited in 40 CFR 264.552(e)) as the primary means to ensure that CAMUs where wastes will remain in place after closure will continue to be protective. As noted in the preamble to the Final CAMU Rule, USEPA states “… The Agency believes that these standards are appropriate minimum standards…because they will, among other things, be protective across a wide range of waste and site conditions.”

The Final CAMU Rule contemplates siting a CAMU in areas of existing contamination like the LOSA, and the current conceptual design of CAMU 3 will meet or exceed all of the minimum design requirements of 40CFR264.552(d) and (e). The preamble to the Final CAMU Rule states, “…at some highly contaminated facilities, CAMUs may be located in areas of significant contamination…pervasive throughout the subsurface. At such facilities, remedial approaches may involve long-term ground water pump-and-treat systems, or subsurface soil contamination may be expected to remain in place as a source of ground water contamination. At these types of facilities, a liner and leachate collection system to reduce migration of hazardous constituents into an already significantly contaminated subsurface likely would not meaningfully increase protection of human health and the environment and would not be the best use of cleanup resources…" The Final CAMU Rule goes on to specify (40CFR264.552(e)(3)(ii) that USEPA may consider alternative, less stringent, approaches to the minimum design standards for liner and leachate collection systems at CAMUs located in areas of significant existing contamination.

2.2.4.2 Reducing the Footprint of Contamination

Locating CAMU 3 in the LOSA area, which has been contaminated by past smelter operations, will reduce the overall "footprint" of contamination at the Facility. Placing the CAMU outside the boundaries of the former Smelter site and adjacent to the existing CAMUs will encumber additional acreage that is relatively uncontaminated (when compared to the former Smelter site). It should be noted that locations within the former Smelter site boundaries were not a reasonable option for ASARCO at the time the first two CAMUs were constructed because it would have interfered with ongoing smelter activities, and therefore the first two CAMUs were placed outside the operational area.

2.2.4.3 Protectiveness

There are several factors associated with the proposed location that contribute to the long-term protectiveness of the CAMU design:

- The hydrogeology and hydrology of the LOSA enhance the CAMU's long-term protectiveness in many ways, summarized as follows:
  - There is significant separation between the CAMU and groundwater. The CAMU bottom liner will be at or near the existing ground surface and approximately 30 to 40 feet above groundwater and provides a buffer distance which will lessen the chance for contamination to reach groundwater in the unlikely event that a leak would occur. The stratigraphy and occurrence of groundwater near the center of the proposed CAMU area is delineated by monitoring well pair DH-61 and DH-62. The ash/clay layer was encountered at 30 feet in these borings, with DH-61 screened from 20 to 30 feet below ground surface (bgs). Since completion in May 2001, groundwater has never been present in DH-61 even during the very wet 2011 spring season. DH-62 is completed at a depth of 65 to 75 feet at the same location with static water levels ranging from 40 to 45 feet, or 10 to 15 feet below the top of the ash/clay. This information demonstrates that the tertiary sediments above the lower permeability ash/clay unit are unsaturated in this area of the site.
  - The topography and geology of the site will also enhance the CAMU's long-term protectiveness. The LOSA will be unlikely to experience slope stability failures, landslides, or other debris flows because the site is relatively flat. Subsurface explorations have demonstrated that the LOSA is founded upon dense and unsaturated sands and gravels. These soils have a relatively high strength so the CAMU is unlikely to experience a bearing capacity failure or significant settlement. Subsurface explorations have also shown that a 5- to 10-foot-thick layer of silt is found within the first 5 to 15 feet bgs, and a 20- to 30-foot-thick layer of volcanic ash is found approximately 30 to 50 feet bgs. These fine-grained soils have relatively low permeabilities that will inhibit the flow of contaminated liquid to groundwater. The likelihood of seismic damage will be evaluated as appropriate during final design of the CAMU.
  - CAMU 3 is located outside the 100-year floodplain.
  - The chance of an accidental release of leachate to surface water will be minimal, as the LOSA is currently more than 1,000 feet from the nearest body of water (specifically, Upper and Lower Lakes). This buffer distance will increase over time as the lakes are drained and transformed into wetlands as part of the SPHC IM.

The location of CAMU 3 within the area of the former Smelter site will provide additional measures of safety and protectiveness during IM implementation and long term operation and maintenance:

- Before the ET Cover System is in place, the current site topography and existing drainage structures will prevent stormwater from running on to and off of the LOSA. CAMU 3 will enhance future stormwater and erosion control with new stormwater drainage structures such as ditches, roads, and berms.
- Placing the CAMU closer to areas where IMs are being implemented will reduce the length of haul routes and reduce vehicle miles travelled and equipment operating time. This will also reduce fuel consumption, lessen emissions, and improve safety. Reducing the need for vehicles to leave the former Smelter site limits will reduce the amount of water for needed for decontamination, dust control, and cleaning, and ultimately reduce the amount of water consumed, treated, and discharged.
- In the event that the HDS water treatment plant is maintained after 2015, placing the CAMU onsite near the HDS water treatment plant will create a closed loop for leachate management and minimize the distance leachate will have to travel to be treated. This reduces the likelihood of spreading contamination by spills or leaks.

2.2.4.4 Cost-Effective Construction, Post-closure Care and Monitoring

Placing CAMU 3 in the LOSA area will reduce construction costs as well as the long-term cost of maintenance and monitoring which will be performed to demonstrate continued protection over time. Factors include:

- The ET Cover System proposed for the former Smelter site will also provide the final cover for CAMU 3. This provides significant savings in both construction and long-term maintenance costs by eliminating the need to design, construct, and maintain a separate final cover system.
- The former Smelter site will require long-term monitoring to demonstrate performance of the ET Cover System and to evaluate changes in groundwater quality over time, which will provide an additional level of monitoring for the CAMU. The LOSA is already surrounded by a network of monitoring wells, which will be modified as necessary to collect the data required to demonstrate remedy performance. Incorporating new wells into the existing network will provide a focused and robust monitoring system to evaluate groundwater quality.

2.2.4.5 Integration with Final Remedies

Locating CAMU 3 in the LOSA area will compliment the performance of the proposed interim measures and is not expected to preclude additional potential final remedies for this area, as summarized below:

- The LOSA location will provide the ability to expand or contract the size of the CAMU if necessary to support future remediation actions. The amount of waste that will ultimately be placed in the CAMU is currently unknown. The CAMU footprint, however, is large enough that storage capacity may be increased or reduced by simply changing the slopes and elevations of the finish grading plan during waste placement. Such flexibility would not be possible on in the areas adjacent to the first two CAMUs without encroaching on a large area of land that is believed to be much less contaminated than the LOSA location.
- Although there are inorganic contaminants present in soils beneath the LOSA, the area beneath the footprint of the CAMU is not a candidate for future source removal actions. Based on the current CSM, the highest contaminant concentrations are present in the surface and near surface soils and are not in contact with groundwater. Construction of CAMU 3 will immediately “cap” this area and eliminate infiltration of precipitation, effectively preventing leaching of contaminants to groundwater.

2.2.5 Prickly Pear Creek Temporary Bypass Construction

2.2.5.1 Objective

The objective of the PPC Temporary Bypass construction is to facilitate implementation of the realignment of PPC being done as part of the SPHC IM, and it will contribute to lowering of the groundwater table in the south area of the former Smelter site. The temporary bypass will also provide benefits to the Source Removal IM by reducing the amount of groundwater to be managed during any excavation and removal of inorganic-contaminated sediments in Upper Lake and soils in Tito Park.

2.2.6 Description

The PPC Temporary Bypass alignment begins upstream of the existing Upper Lake diversion structure (see Figure 2-3). The bypass turns east into the adjacent tertiary bench to divert water away from the excavation areas and then moves northward to a termination point just downstream of Smelter Dam. The bypass construction will include a floodway designed to provide additional hydraulic capacity to mitigate potential flooding during bypass operation. These evaluations have been done to support permitting and design efforts and are discussed further in Sections 5 and 7.

Construction of the bypass will require the excavation, processing, and stockpiling of approximately 260,000 yd^3 of material. This material is planned for reuse in other IMs to be completed at the site (for example, construction of the ET Cover System) and will be tested, as appropriate, to determine what actions are need for protection of human and ecological receptors. Material stockpiles will be situated on the East Bench, near the construction area and within the AOC.

The temporary bypass will divert PPC around Smelter Dam, the Upper Lake diversion structure and the PPC realignment area. The diversion is necessary to allow the Upper Lake diversion structure to be demolished and removed, Smelter Dam to be removed and the Upper Lake dam to be breached, thereby lowering groundwater levels in the South Plant area as part of the SPHC. The passive dewatering that will result from diverting PPC to the east will also allow potential source removal work in Tito Park and Lower Lake to be done in a safe, efficient, and cost-effective manner. In addition, materials that will be excavated during construction of the bypass channel will be used as part of the future ET Cover System construction.

2.2.7 Technical Evaluations

As described in the IM Work Plan 2012, several technical efforts have been completed or are underway to evaluate the potential performance and benefits of the SPHC IM. Key developments since the IM Work Plan 2012 was issued in September 2012 are summarized in Section 4 of this IM Work Plan 2013 and include the following:

- Additional data on the potentiometric surface of the former Smelter site have been collected as part of the groundwater monitoring events performed by the Custodial Trust in accordance with the *Draft 2012 Groundwater and Surface Water Field Sampling and Analysis Plan, East Helena Facility* (FSAP; Hydrometrics, 2012a). These data are being integrated into conceptual site models and other evaluations being conducted.
- Significant work on the Upper Lake drawdown test has been completed as of October 2012, with ongoing activity focused on monitoring the post-drawdown recovery. The purpose of the test was to simulate the effects of eliminating recharge from Upper Lake on plant site groundwater levels, flow rates, and contaminant loading to groundwater by lowering the water level in the lake. Key information is summarized as follows (and additional details are provided in technical memoranda which summarizes the testing in Appendix A):
  - The Upper Lake drawdown test involved three distinct phases, including passive lake dewatering achieved by shutting off the diversion inflow from Prickly Pear Creek, lowering Prickly Pear Creek adjacent to the plant site, and pumping from the lake to expedite lake level drawdown. The first phase of the test began in November 2011 and continued through March 2012. The creek lowering phase overlapped with the passive dewatering phase and occurred from December 2011 to February 2012. The third (lake pumping) phase was initiated in March 2012 and monitoring of the system recovery to this pumping phase is ongoing as of the date of this IM Work Plan 2013.
  - Data collection during the test has included continuous water level monitoring at a total of 35 groundwater and surface water sites instrumented with pressure sensitive transducers, and manual measurements at an additional 20 sites. The water level data is intended to quantify the groundwater level declines across the plant site, and determine effects of the lake drawdown on hydraulic gradients and groundwater flow rates across the plant site.
  - As of September 13, 2012, the water level in Upper Lake had declined by almost five feet since the November 1, 2011 test startup. Groundwater levels during this time declined by four to five feet in the

south portion of the plant site, three to four feet in the central plant site, and four to six feet in the northwest portion of the plant site.

- Water level declines in the south plant site are attributable to the proximity of this area to Upper Lake while the larger declines in the northwest plant site are attributable to the Upper Lake drawdown, as well as a lack of flow in Wilson Ditch in 2012. The lack of ditch flow in 2012 is related to the Upper Lake drawdown test as Wilson Ditch is fed by a headgate on Upper Lake.
- Water levels in the northeast portion of the plant site (beneath the slag pile) declined by less than one foot, suggest the shallow groundwater system in this area has limited interaction with water levels in Upper Lake and the south plant area.

- Work continues on the groundwater flow, fate, and transport modeling effort, which was initiated in March 2012 by the Custodial Trust.
- Additional evaluations performed to support the SPHC IM design include studies on the fluvial geomorphology, Hydrologic Engineering Centers River Analysis System (HEC-RAS) modeling described below, and ongoing natural resource evaluations to identify and protect important resources during IM implementation.

In addition to these hydrogeologic evaluations, hydraulic (i.e., stormwater) evaluations have been ongoing. As noted in the IM Work Plan 2012, a primary goal and a permitting requirement for SPHC IM implementation and all work associated with PPC is to avoid negative downstream flood impacts, especially to the City of East Helena. Floodplain modeling and evaluations are ongoing and results will be made available to the general public and all agencies participating in the project as part of the information being submitted through the permitting process.

Additionally, the Custodial Trust is completing floodplain engineering and analysis to verify conceptual engineering evaluations completed to date and to obtain permits. The current efforts are focused on the impacts potentially caused by changes to the existing floodplain resulting from construction of the PPC Temporary Bypass. Predicted flow conditions in the bypass channel have been modeled using HEC-RAS, which illustrates the boundaries of the floodplain under 100- and 500-year flood flows. This information was delivered to FEMA in August 2012 for their review and issuance of a Conditional Letter of Map Revision (CLOMR). FEMA issued their approval of the CLOMR on December 5, 2012. FEMA's approval of the CLOMR fulfilled the technical requirements of the City of East Helena's floodplain permit. The city also requires evidence that the other required permits (e.g., MDEQ 318, LCCD 310, USACE Section 404) have been issued before they commence their floodplain permit process. As of January 1, 2013, these other permits had been issued and provided to the city, and the city had begun processing the floodplain permit application according to the standard requirements of their floodplain ordinance.

Engineering efforts in 2013 will focus on performing similar hydraulic modeling for the proposed realignment of the PPC channel; an additional CLOMR application will be submitted to FEMA for the realignment of PPC, and another floodplain development permit will be issued by the City of East Helena to authorize construction of the channel.

Additional design and construction information on the PPC Temporary Bypass is provided in Section 5, and relevant permitting updates and activities are outlined in Section 7.

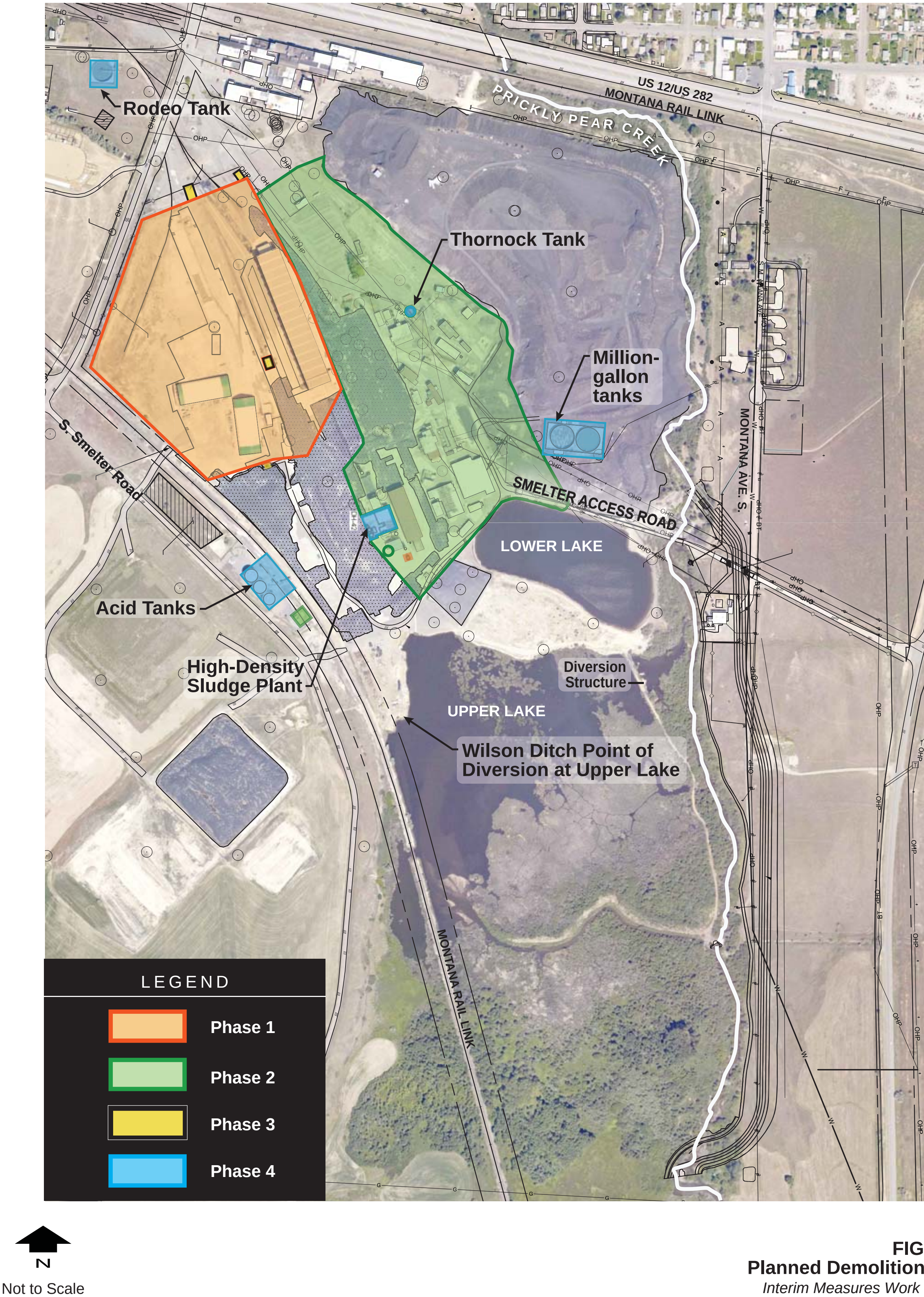

FIGURE 2-1
Planned Demolition Phases
Interim Measures Work Plan–2013
East Helena, Montana

FIGURE 2-2
Corrective Action Management Unit 3
Conceptual Layout
Interim Measures Work Plan–2013
East Helena, Montana

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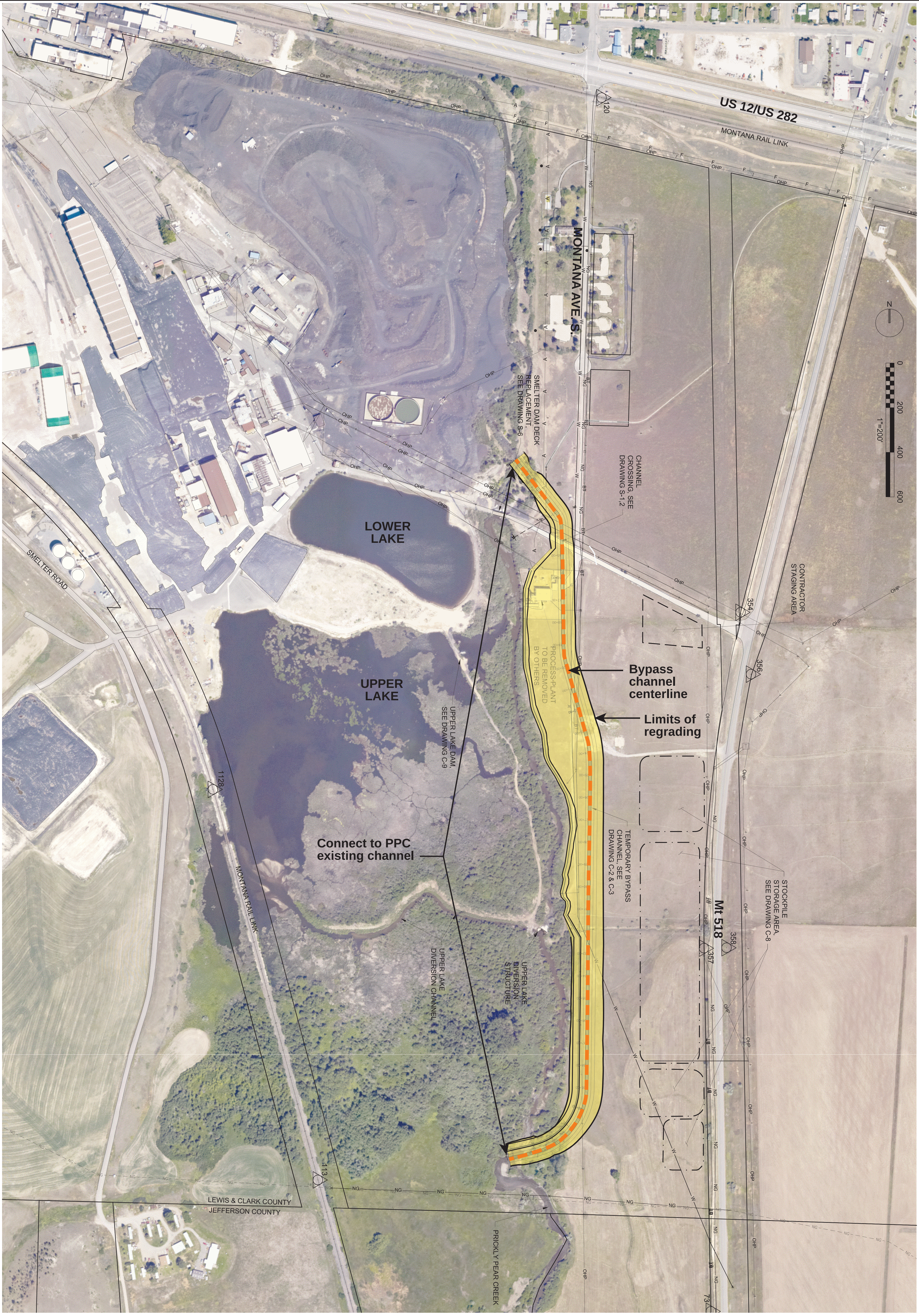

LEGEND

PRICKLY PEAR CREEK (PPC) TEMPORARY BYPASS

FIGURE 2-3
Prickly Pear Creek Temporary Bypass Conceptual Layout
Interim Measures Work Plan–2013
East Helena, Montana

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SECTION 3

Updated Conceptual Site Model

This section provides updates to the former Smelter site CSMs presented in earlier documents (e.g., the IM Work Plan 2012 [CH2M HILL, 2012a] and the draft Phase II RFI Report [GSI, 2011]). CSMs for the former Smelter site and Corrective Measures Study properties are evolving models, and as such will continue to be revised as appropriate to incorporate relevant new information from field activities and other ongoing evaluations. The CSM described in the following sections focuses on the two areas most relevant to the proposed 2013 work. The two focus areas are: (1) the former LOSA and adjacent features, referred to collectively as the "LOSA and Adjacent Features," and (2) the East Bench. Figure 3-1 shows these areas with respect to the former Smelter site.

This CSM integrates existing information pertaining to site conditions, nature and extent of contamination, and fate and transport mechanisms. Section 3.1 summarizes general background information for the former Smelter site. Section 3.2 presents an overall CSM for the former Smelter site. Sections 3.3 and 3.4 present more detailed CSMs specific to the LOSA and Adjacent Features and the East Bench, respectively.

The conservative screening-level values (SLVs) used in the draft Phase II RFI Report have also been used in the CSMs to provide a reference when evaluating soil and groundwater quality. With the exception of the maximum contaminant levels (MCLs) for groundwater, these screening levels do not reflect media cleanup standards.

SLVs for soil were defined in the draft Phase II RFI Report as follows:

- SLVs for soil, protective of groundwater, are the USEPA's Soil Screening Levels (SSLs) (USEPA, 2012) developed to protect groundwater quality from contaminants leaching from soil to groundwater at levels exceeding MCLs.
- SLVs for soil, protective of human health, are the USEPA's Regional Screening Levels (USEPA, 2012) developed to protect human health from direct contact and incidental ingestion of soils.
- SLVs for soil, protective of ecological receptors (terrestrial plants, invertebrates, and wildlife), are the USEPA's Ecological SSLs. For instances in which no USEPA Ecological SSLs are available, the Oak Ridge National Laboratory Preliminary Remediation Goals for Ecological Endpoints (Efroymson et al., 1997) are adopted. The SLVs referenced herein for groundwater are MCLs.

3.1 Former Smelter Site Description and Physical Setting

This section describes the location, setting, geology, and hydrogeology of the former Smelter site. A detailed description of the site setting, geology, and hydrogeology is provided in the draft Phase II RFI Report (GSI, 2011). Section 3.2.1 summarizes the operational history.

3.1.1 Location and Setting

The 142-acre former Smelter site is located in the Helena Valley, approximately 3 miles east of the City of Helena. The site is bounded to the north by Highway 12 and the American Chemet facility; to the south by Upper Lake, Tito Park, and Lower Lake; to the east and northeast by PPC; and to the west and southwest by open agricultural land and the Manlove neighborhood (Figure 3-1). The natural topography slopes gently to the north and the center of the former Smelter site is approximately 3,900 feet above mean sea level (AMSL). The climate is classified as modified continental with cold winters, moderate summertime temperatures, 11.2 inches of annual precipitation, and 8.5 to 9.6 inches of annual evapotranspiration. The prevailing wind direction is easterly. Surface water bodies at or near the former Smelter site are shown on Figure 3-1 and summarized in Table 3-1.

TABLE 3-1
Surface Water Bodies

Body of Water	Purpose	Sources of Water[b]	Discharge[b]	Size[c]
Prickly Pear Creek[a]	Natural drainage used for mining, agricultural, industry	Headwaters in mountains, surface runoff, seepage from groundwater	Surface flow to Lake Helena (7 miles downstream), seepage to Upper Aquifer, diversion to Upper Lake and Upper Lake Marsh, irrigation diversions	25 to 30 ft^3/s (base flow), 50 to 300 ft^3/s (seasonal peak flow)
Upper Lake	Former Smelter industrial water supply	Surface diversion from PPC, other tributary inflows	Surface flow to PPC, release to Wilson Ditch (seasonal), seepage to Upper Aquifer	20 acres (surface area), 5 to 12 feet (depth)
Upper Lake Marsh	Former Smelter industrial water supply	Surface diversion from PPC, seepage of groundwater	Surface flow to Upper Lake, seepage to Upper Aquifer	Inches to 2 feet (depth)
Wilson Ditch[d]	Agricultural	Released from Upper Lake (seasonal), seepage of groundwater	Seepage to Upper Aquifer (seasonal)	1.46 to 8.26 ft^3/s (seasonal)
Lower Lake	Former process water pond	Treated stormwater, seepage from Upper Aquifer	Seepage to Upper Aquifer	7 acres (surface area), 11 million gallons (capacity)

Notes:

[a] Prickly Pear Creek flows north. It receives flow from groundwater near the former Smelter site and loses flow to groundwater up and downstream of the former Smelter site.

[b] Table excludes direct precipitation into and evaporation from bodies of water.

[c] ft^3/s = cubic feet per second.

[d] Wilson Ditch currently runs through an underground high-density polyethylene pipe alongside the former Smelter site, and an open unlined ditch downstream of the former Smelter site.

3.1.2 Geology

The former Smelter site is located on an alluvial plain consisting of relatively thin layers of alluvium, colluvium, sands, and gravels. The younger sediments overlie thicker layers of stratified volcanic tuff and bedrock; the uppermost part of the unit is a weathered volcanic ash that forms an aquitard. As shown in Section A-A' (Figure 3-2), the depth of the aquitard increases from about 20 feet bgs at the south end of the facility (near DH-20) to 50 feet bgs at the north end of the former Smelter site (near DH-67). The southern side of the Helena Valley is defined by a series of major seismically active faults, including one inferred to be approximately 1,500 feet north of the former Smelter site. The lithologic layers are summarized in Table 3-2.

TABLE 3-2
Typical Lithologic Layers

Layer Name	Layer Symbol	Predominant Rock Types	Typical Thickness (feet)	Typical Permeability
Quaternary Alluvial Deposits, Alluvium, and Colluvium[a]	Qa, Qal, Qac	Cobbles, gravels, and sands; with silt/clay further from stream channels	Few to 60	Water-bearing layer
Younger Tertiary Alluvial Sediments	QTg	Weakly cemented sand and gravel	0 to 60	Likely less than overlying material
Early Tertiary (Oligocene) Sediments	OgTs, OgS	Stratified volcanic tuff with interbedded clastic sediments, weathered clayey ash at top	40 to 60[b]	Variable, but in general relatively low
Spokane Formation Metasedimentary Basement Rock[c]	Ys	Argillites, siltites, slates, quartzites	Unknown	Extremely low (unless fractured)

Notes:

[a] This layer forms the existing ground surface at the former Smelter site. There is a thin veneer of silt across much of the former Smelter site.

[b] At the northern end of the former Smelter site. Thickness is undefined elsewhere; the bottom of this layer is believed to be more than 100 to 150 feet below ground surface.

[c] This layer is generally known as "bedrock."

3.1.3 Hydrogeology

Groundwater under the former Smelter site is present in two aquifers that are separated by an aquitard of weathered clayey-ash (Figure 3-3). The hydrostratigraphic units are summarized in Table 3-3. The Upper Aquifer is the focus of the groundwater investigation and the vast majority of the monitoring wells are completed in this unit. In previous investigations (Asarco Consulting, Inc., 2005), the Upper Aquifer was divided into a "shallow aquifer" and "deeper 'intermediate' aquifer" based on the presence of fine-grained lenses. Upon further review of available information, the shallow and deeper portions of the upper aquifer are believed to be in direct hydrologic communication and to act as a single shallow aquifer system. The bottom of this unit slopes to the north, which is consistent with the general flow direction of north to northwest. The general direction of groundwater flow in the Deeper Groundwater System (below the aquitard) is also toward the north. Both of these aquifer systems discharge into Lake Helena, located approximately 7 miles north of the former Smelter site. Synoptic streamflow measurements indicate that PPC is generally a losing stream, except for two stretches in which PPC is a gaining stream (Figure 3-4). These areas appear to act as a hydraulic divide to prohibit flow to the east beyond PPC (GSI, 2011).

TABLE 3-3
Hydrostratigraphic Units

Unit Name	Layer[a]	Source of Recharge[b]	Discharge Locations	Groundwater Gradient[c]	Hydraulic Conductivity[d]	Comments
Younger Valley-Fill Sediments (Upper Aquifer)[e]	Qa, Qal, Qac, QTg	Surface water bodies[f], seepage from irrigation ditches/canals, discharge from deeper aquifer	Springs; seepage to PPC; Lake Helena, and gravel ponds; yield to water supply, irrigation, and industrial wells	Horizontal is 0.012 to 0.025 foot/foot; Vertical is varied: 0.001 (downward) to 0.393 (upward) foot/foot	2 to 700 feet/day	Upper Lake, Lower Lake, PPC, and Wilson Ditch cause ground-water mounding
Oligocene weathered clayey-ash (aquitard)	Top of OgTs, OgS	Not applicable	Not applicable	Not applicable	Not applicable	Discontinuous to west, presence not confirmed to east
Deeper Ground-water System	Lower part of OgTs and OgS	Recharge to the deeper groundwater system likely occurs through upward seepage from deeper bedrock units on and near the plant site, and possibly from direct precipitation, snowmelt, stream leakage, and downward seepage from overlying units in upgradient areas south of the plant site	Lake Helena; seepage into gaining streams; springs; seepage to Valley-Fill aquifer; yield to water supply, irrigation, and industrial wells	Upward into Upper Aquifer: 0.030 to 0.082 foot/foot	3 to 11 feet/day	Extent not known

Notes:

[a] Refer to Table 3-2 for description of lithologic layers.

[b] Table excludes snowmelt and direct precipitation into both aquifers.

[c] Gradients vary by location.

[d] Determined by slug and pump testing.

[e] In previous investigations (Asarco Consulting, Inc., 2005), the upper aquifer was divided into a shallow aquifer and deeper "intermediate" aquifer based on the presence of these fine-grained lenses. Further review of available information suggests that the shallow and deeper portions of the upper aquifer are in direct hydrologic communication and act as a single shallow aquifer system.

[f] Refer to Table 3-1 for description of surface water bodies.

Recharge to the Upper Aquifer at the former Smelter site occurs from natural processes, ASARCO's diversion of PPC into Upper Lake to provide a process water source, and discharge of treated stormwater to Lower Lake. Additional recharge to the Upper Aquifer is attributed to upward flow from the Deeper Groundwater System. Recharge to the Upper Aquifer locally is also a result of PPC seepage and precipitation. Water table fluctuations have been recorded ranging from 2 to 12 feet, and up to 5 feet at the former Smelter site.

Surface water bodies (primarily PPC, Lower Lake, and Upper Lake) at the former Smelter site (Figure 3-4) are also significant sources of recharge and contribute to groundwater mounding in the Upper Aquifer locally. Upper Lake and Lower Lake were artificially created when water from PPC was diverted to Upper Lake (formerly a marsh area). Placement of fill to the north of Upper Lake and construction of an earthen berm along its east side provided a suitable water source (Lower Lake) for the operations at the former Acid Plant. As its size increased, leakage from Upper Lake to groundwater also increased. Leakage is most significant along ancestral creek channels that transect the former marsh (now Upper Lake) toward the northwest and provide high-permeability zones within the gravels and cobbles of the former channels. The configuration of the offsite arsenic and selenium plumes is surmised to be partially controlled by the relatively higher permeability of the ancestral creek channel alignments. The significance of such recharge to the Upper Aquifer and their effect on groundwater flow locally are confirmed by results presented in the Upper Lake Drawdown Test Technical Memorandum (Appendix A; Hydrometrics, 2012b).

3.2 Conceptual Site Model for Former Smelter Site

This section integrates existing information to update the CSM for the former Smelter site first presented in the IM Work Plan 2012 (CH2M HILL, 2012a). To understand the CSMs of the LOSA and Adjacent Features and the East Bench, it is beneficial to have an overall understanding of the nature and extent of contamination identified at the former Smelter site, and the transport mechanisms that control the migration of the contamination. The descriptions of soil and groundwater contamination in this section are summarized based on findings reported in the draft Phase II RFI Report.

3.2.1 Background and Historical Sources of Contamination

ASARCO's Smelter began operating in 1888 and shut down in April 2001. Although lead bullion was the primary product, the Smelter also produced zinc (from 1927 to 1982), sulfuric acid, and matt- and copper-enriched speiss. The waste products produced by the former Smelter site included stack emissions, fugitive emissions from smelting operations, slag, acid plant sludge, and wastewater from scrubber systems. Historical operations were the original sources of contamination to soil, surface water, and groundwater. The sources included stack emissions, materials handling and storage, waste disposal practices, leaks from process water systems, and infiltration from dust suppression activities. These operational sources were eliminated when Smelter operations ceased in 2001.

The manufacturing, regulatory, and environmental history of the former Smelter site has been well documented, most recently in the draft Phase II RFI Report. Except where noted, much of the background information and findings of previous work that is presented in this section is extracted from the draft Phase II RFI Report.

3.2.2 Soil Contamination

Surface and subsurface soil contamination is significant and widespread throughout the former Smelter site at concentrations which are orders of magnitude higher than levels considered protective of human and ecological receptors. Although some interim measures were implemented by ASARCO (buildings have been demolished, shallow contaminated soil has been excavated, and residual contamination has been capped), leaching of metals from surface and subsurface soil continues to pose a threat to groundwater quality within the former Smelter site. The results of leaching tests and the extent of their groundwater plumes indicate that arsenic and selenium are the soil contaminants that have the greatest impact on groundwater quality. They are the primary constituents of potential concern (COPCs) and therefore the focus of this summary discussion.

The concentration of arsenic in surface soils varies widely across the former Smelter site, from 8 to 11,500 milligrams per kilogram (mg/kg), with an average between 1,000 and 2,000 mg/kg. In subsurface soil, the highest concentrations are present in the unsaturated zone above the water table. The high concentrations in surface soils indicate that direct contact and surface erosion are concerns. In subsurface soils, leaching of arsenic to groundwater either through infiltration or water level fluctuations is a concern.

Similar to arsenic distribution in soils, the data show that selenium in surface soils varies from 0.49 to 1,310 mg/kg, with an average between 50 and 150 mg/kg. In general, the concentrations increase slightly in the first foot of depth, then decrease with depth until reaching less than 5 mg/kg or below the method detection limit at approximately 10 feet bgs. Selenium concentrations are present in the soil at shallow depths greater than project SLVs and background. The high concentrations in surface soils indicate that direct contact and surface erosion are concerns. In addition, the batch adsorption tests documented in the draft Phase II RFI Report (GSI, 2011) indicate that selenium can be transported to groundwater through infiltration and groundwater fluctuations in shallow groundwater zones.

3.2.3 Groundwater Contamination

Arsenic has the highest exceedance rate (SLV is 0.01 milligram per liter [mg/L]) of any measured constituent. The arsenic plume extends generally north-northwest (Figure 3-5) and appears to be centered on former processing and material handling areas. Arsenic concentrations within the plume are relatively high and uniform with depth in the Upper Aquifer. Concentrations below the aquitard are low. Downgradient of the former Smelter site, arsenic concentrations rapidly decrease by approximately three orders of magnitude; at most downgradient paired wells beyond East Helena, concentrations are below the MCLs. The lateral extent of the arsenic plume appears to be relatively stable, if not diminishing, over the past 10 years or more. Results of the batch adsorption test documented in the draft Phase II RFI Report (GSI, 2011) suggest that arsenic adsorption may be occurring in the subsurface. In addition, coprecipitation of arsenic with iron and manganese oxides is very common. As a result of the presence of these metals (iron and manganese) in groundwater, it is likely that these mechanisms are actively attenuating arsenic in groundwater. Thus, the arsenic plume has a significantly smaller footprint compared to the selenium plume.

In oxygenated groundwater, selenium is more mobile than arsenic and has the largest plume footprint (Figure 3-6). The selenium plume extends generally north-northwest of the former Smelter site. The eastern lobe is centered under the slag pile, and the western lobe is centered proximal to the Thaw House and Concentrate Storage and Handling Building (CSHB). The vertical extent of contamination is limited to the Upper Aquifer. The northwest trending plume extends into Lamping Field and generally parallels PPC. The transient nature of the plume is consistent with the predominant chemical form of selenium in groundwater being Se(VI), the most-mobile redox species. The results of the batch and leaching tests performed during the Phase II RFI indicated no capacity for selenium adsorption on any of the tests and a high leaching rate, respectively.

Although arsenic and selenium are the primary COPCs in groundwater, data also show that the other site-related contaminants are found within the aerial extent of the arsenic and selenium plumes. COPCs identified in the draft Phase II RFI Report include aluminum, antimony, cadmium, lead, manganese, mercury, thallium, vanadium and zinc.

3.2.4 Contaminant Transport

The conceptual understanding of contaminant transport at the former Smelter site is summarized as follows:

- Historical operations at the former Smelter site were the original sources of contamination to soil, surface water, and groundwater. The sources included stack emissions, materials handling and storage, waste disposal practices, leaks from process water systems, and infiltration from dust suppression activities. These operational sources were eliminated when Smelter operations ceased in 2001. The primary ongoing sources to groundwater and soil are attributable to residual contamination left by historical operations. Soil data indicate that arsenic and selenium concentrations above SLVs are found below the ground surface; the concentrations generally decrease with depth.
- Previous remedial measures implemented by ASARCO were designed to address some of the known source areas, including the Speiss-Dross Area and the Acid Plant Area.

- The current sources for arsenic and selenium contamination in groundwater at the former Smelter site include Lower Lake sediments, residual impacted soil, and slag.
  - Lower Lake sediments contain arsenic and selenium from historical operations that impact groundwater through seepage.
  - Soils appear to be the most significant, ongoing source of arsenic loading to groundwater.
  - Although residual impacted soil may be the source of selenium in the lower concentration portions of the selenium plume, another source of selenium appears to have been the historical discharge of process water to Lower Lake and subsequent seepage.
  - Leaching tests have indicated the potential for arsenic and selenium to leach from the slag pile on the eastern edge of the former Smelter site. Previous studies concluded that the leach rate is very low under natural conditions, and this will be further evaluated as part of the overall Corrective Measures Study.
- The most significant contaminant transport mechanism to groundwater is from contaminated soils. Multiple mechanisms are currently in place to facilitate contaminant loading to groundwater from soils. These include infiltration, recharge from Upper Lake and Lower Lake, and groundwater fluctuations across contaminated soils. Findings of the Upper Lake drawdown testing (Hydrometrics, 2012b) have contributed to a better understanding of the various mechanisms.
  - Precipitation and stormwater runoff infiltrating into residual soils can leach contaminants from soil to groundwater.
  - Mounding from Upper Lake and Lower Lake at the southern end of the former Smelter site provides a significant source of recharge to the groundwater system upgradient of the former Smelter site. The following factors affecting contaminant transport are related to the mounding:
    - Higher groundwater elevations in the southern portion of the former Smelter site increase groundwater flow gradients across the site and subsequently velocities.
    - Groundwater mounding raises groundwater elevations thus increasing contact between groundwater and residual soils.
    - Elevated groundwater levels allow flow through former creek channels. These channels are relatively more permeable, thus allowing preferential migration.
    - Groundwater fluctuations of up to 5 feet locally have been identified from the recharge that is dependent on seasonal factors such as snowmelt and irrigation. The rise and fall of the water table can cause leaching patterns similar to infiltration when the water table is in contact with residual soils.

3.3 Conceptual Site Model for LOSA and Adjacent Features

This section presents the CSM for the LOSA and Adjacent Features. The LOSA and Adjacent Features comprise the former LOSA, where feed materials and excavated soils were once stockpiled. Features include adjacent rail corridors; the CSHB; the former Thaw House; and portions of the pre-1997 alignment of Wilson Ditch for the former Smelter site (Figure 3-7). For simplification of this discussion, the word “former” is assumed in reference to the LOSA and the Thaw House. The LOSA and Adjacent Features have been grouped because they are located in proximity to one another within the western half of the former Smelter site, in an area that has also been commonly known as the Central Plant Area. The CSHB is located just outside and east of the CAMU 3 footprint; however, its historical operations are relevant to understanding the LOSA and Adjacent Features.

Demolition activities have been conducted in the LOSA and Adjacent Features area since the former Smelter shut down in 2001. Currently, the majority of this area is covered with asphalt or concrete. Exceptions include the Thaw House, which is covered with a temporary synthetic liner, the rail corridors where the ground surface consists of unconsolidated soil and fill (including slag and brick fragments), and northern portions of the LOSA.

3.3.1 Background and Historical Sources of Contamination

This section describes the operational history and interim measures (where appropriate) conducted at the LOSA, rail corridors, CSHB, Thaw House, and portions of the pre-1997 alignment of Wilson Ditch.

3.3.1.1 Former LOSA

The former Smelter site processed a wide variety of feed materials obtained from different sources, including ore concentrates, crude ores, flux materials, and various dusts, residues, slag and other metals-bearing byproducts. Prior to completion of the CSHB in 1990, incoming feed materials, as well as certain dusts and other byproducts generated onsite, were stored outside at the LOSA. After 1990, ores and ore concentrates were stored in the CSHB, but fluxes, fuels, and smelting byproducts continued to be stored outside at the LOSA. With the exception of relatively inert materials such as lime rock, coke and silica-based materials, all materials stored outside were reportedly stored on concrete pads. The LOSA was also used for storage of soils excavated during the former Smelter site construction and remediation activities. Sediments dredged from Lower Lake in the mid-1990s were stored in the southern portion of the LOSA on a concrete pad and covered with an impermeable liner.

In 2001, all stockpiled soils and sediments were removed from the LOSA and placed in the Phase I CAMU cell, located offsite to the west of the former Smelter site. Following stockpile removal, the area underwent minor re-grading but was not capped or covered with borrow soil material.

3.3.1.2 Rail Corridors

Rail corridors were used to transfer various materials to and throughout the former Smelter site. These corridors entered the former Smelter site from the north and carried materials to the rest of the smelter between the LOSA and CSHB. They were constructed on top of fill material that includes slag, brick debris and other non-native materials. The rail corridors in this area regularly were used for storage of various feed, flux, and byproduct materials.

While some of these areas have been removed (excavated and capped) as part of previous demolition activities performed by ASARCO, others remain as areas of exposed soils and fill debris, prone to stormwater infiltration.

3.3.1.3 Concentrate Storage and Handling Building

The CSHB, or Ore Storage Building, was constructed in 1989-90 for handling and storage of incoming ore feed material (concentrates) and will be removed during Phase 1 demolition. The building was used for crushing, blending, and storage of most incoming feed material prior to processing. Feed material was moved in rail cars from the Thaw House to the Crushing Plant located at the northern end of the CSHB. From there, the material was sorted and stored in the interior concrete bins for subsequent blending and mixing before being sent to the Sinter Plant. The CSHB provided a dry environment for feed material crushing and storage starting in 1990; prior to that time, all feed material was stored outside in the LOSA. Dust in the CSHB was controlled through a ventilation and baghouse system with no water reportedly used inside the building either for dust control or for other purposes.

The CSHB underwent cleaning and decontamination in 2008 as part of the former Smelter site's demolition program. The activities included removal of some interior concrete walls and washing down the remaining walls; wash water was collected for treatment and concrete, dirt, and dust debris was placed in the Phase II CAMU located offsite to the west of the former Smelter site. Demolition waste samples, primarily dust samples vacuumed from the debris, had relatively high metals concentrations.

3.3.1.4 Former Thaw House

The Thaw House was located northwest of the CSHB and operated from the start of Smelter operations until the 2001 shutdown. During winter months, rail cars loaded with feed material (ore and ore concentrates) were heated in the Thaw House to melt and drain water from the feed material. Meltwater from the railcars drained onto the dirt floor where it would evaporate or infiltrate into the subsurface. The Thaw House was razed in 2007. The underlying soils were excavated to depths of about 1 foot, as indicated by collected soil data which showed elevated concentrations in the upper foot of soil only. The excavation area was backfilled with fumed slag, and the building footprint covered with a temporary, 30-millimeter-thick reinforced polyethylene liner.

3.3.1.5 Wilson Ditch

Used for agricultural irrigation, the portion of Wilson Ditch that transected the former Smelter site extended from Upper Lake northwestward directly through the LOSA and Adjacent Features area prior to 1997. Throughout its early history, Wilson Ditch crossed the former Smelter site either as an open ditch or in a buried concrete pipe and was prone to leakage. Water conveyed through the pipe consisted of Upper Lake water, although some stormwater also flowed through the pipe. In mid-1997, Wilson Ditch was rerouted around the former Smelter site along the southern and western perimeters. The original concrete pipe was slip-lined with an underground high-density polyethylene pipeline and is currently used for stormwater conveyance.

3.3.2 Soil Contamination

The LOSA and Adjacent Features area has been investigated under the following programs since 1987:

- Remedial Investigation (RI) of Soils conducted in 1987 (CH2M HILL, 1987)
- Remedial Investigation/Feasibility Study (RI/FS) conducted in 1990 (Hydrometrics, 1990)
- Investigative sampling conducted in 1999 to evaluate potential interim measures (IMs) and summarized in the draft Phase II RFI Report
- Phase I RFI in 2001 (Asarco Consulting, Inc., 2005)
- Phase II RFI in 2010 (GSI, 2011)

Findings from early (pre-1999) investigations identified arsenic, cadmium, and lead as three key COPCs in soil; selenium was identified as a COPC based on subsequent work. These four metals are therefore the focus of the discussion in this section, which describes the current conditions and draws on the earlier studies as appropriate. Figures 3-8 to 3-11 present the surface soil concentrations for the four COPC metals; Figure 3-12 presents a three-dimensional view of arsenic concentrations in area subsurface soil and illustrates how concentrations decrease with depth.

Soil data collected in 2010 indicate that elevated concentrations of metals (exceeding one or more of the SLVs for soil) are still present in surface and subsurface soils, particularly along the rail corridors where limited remedial actions have been implemented. Although concentrations greater than conservative SLVs developed to be protective of groundwater were detected at the bottom of some soil borings, concentrations in this area of the former Smelter site are much lower than those found in upgradient areas affected by the process water system, and generally decrease significantly with depth. The water table is deep (greater than 30 feet bgs) in this area.

The soils collected along the rail corridors generally represent the highest concentrations in the area and remain elevated to a depth of approximately 2 feet bgs, as shown in Figure 3-12. The following summarizes the historical and more recent soil data collected along the rail corridors:

- Seven surface soil samples were collected along the rail corridors south and east of the CSHB as part of the 1987 RI. The average concentrations of arsenic, cadmium, lead, and selenium were as follows: 14,346 mg/kg; 5,791 mg/kg; 18,521 mg/kg; and 153 mg/kg. These were the highest arsenic and cadmium concentrations detected in the surface soil samples collected from the former Smelter site in 1987, and the second highest selenium concentrations.
- Rail corridor soil samples were collected as part of the 2001 Phase I RFI. The average concentrations of arsenic, cadmium, and lead were as follows: 1,659 mg/kg; 1,461 mg/kg; and 15,697 mg/kg, respectively. Selenium was not analyzed. Concentrations decreased with depth for each metal; however, concentrations were reported above their respective SLVs at the bottom of the borings.
- Three soil samples (to a depth of 5 feet bgs) and one soil boring (to a depth of 37 feet bgs) were collected along the rail corridors as part of the 2010 Phase II RFI. Similar to the trends noted from historical samples, concentrations decreased with depth, although they were still above SLVs for several metals. Average concentrations for arsenic, cadmium, lead, and selenium in the surficial soil were as follows: 3,163 mg/kg;

1,518 mg/kg; 27,486 mg/kg; and 402 mg/kg, respectively. Average concentrations in deeper soils were 193 mg/kg; 332 mg/kg; 1,673 mg/kg; and 57 mg/kg, respectively.

Metals detected in the sampled media in this area are the result of years of operational activities such as the transport of feed materials via rail corridors, and the storage and handling of metals-bearing ores and byproducts. The primary medium impacted by activities in the area is soil. The majority of soil contamination is shallow, within the top 3 to 5 feet bgs. The soil concentrations decrease significantly with depth, such that concentrations near the water table are less by up to several orders of magnitude. However, soil concentrations at the water table still exceed the SLVs for protection of groundwater.

3.3.3 Groundwater Contamination

Groundwater impacts in the LOSA and Adjacent Features area can be defined primarily by the arsenic and selenium plumes (Figures 3-5 and 3-6, respectively). Both arsenic and selenium concentrations in groundwater exceed their SLVs for protection of groundwater (0.01 mg/L and 0.05 mg/L, respectively).

Arsenic concentrations detected below the SLV are reported in wells installed along the western portion of the area, generally coinciding with the LOSA. Wells located centrally within the area reported arsenic at relatively low levels, but at or near the SLV. The highest arsenic concentrations are measured in wells located north and east of the LOSA and Adjacent Features area. Arsenic concentrations measured in the most upgradient well (DH-71) are above its SLV, but remain stable at approximately 3 mg/L.

The western lobe of the **selenium** plume within the former Smelter site boundaries is centered on the LOSA and Adjacent Features where maximum concentrations exceed the SLV by up to 2 orders of magnitude. The major axis of this western lobe of the selenium plume appears to run parallel with several of the rail corridors, located between the eastern edge of the LOSA, proximal to the Thaw House and the CSHB. Selenium concentrations measured in the most upgradient well (DH-71) historically have exceeded the SLV, but are reported to be at the SLV of 0.05 mg/L in 2012.

The majority of the wells in the area indicate that arsenic and selenium concentrations are decreasing or stable; however, selenium is increasing in well DH-66, and both selenium and arsenic are increasing in well DH-49 (located downgradient of the LOSA and Adjacent Features area). Increasing concentrations in these wells may indicate that there is a continued source to groundwater. The rail corridors are uncovered, partially remediated, and located upgradient of this well; the impacted soils along the rail corridors appear to be a source of the contamination.

Groundwater in the area continues to be monitored monthly as part of the sitewide monitoring program detailed in the FSAP (Hydrometrics, 2012a). The groundwater data will be evaluated as specified in the FSAP. No additional groundwater data are required.

3.3.4 Contaminant Transport

The current understanding of soil and groundwater conditions and contaminant transport for the LOSA and Adjacent Features area is summarized by transport pathway as follows (Figure 3-13):

- Infiltration of surface water. Along the rail corridors in the area, ores and byproducts fell onto the uncovered surface and migrated vertically via infiltration of precipitation and stormwater into the subsurface and eventually to groundwater. The rail corridor soils in the vicinity of the CSHB and Thaw House have some of the highest total or leachable metals concentrations in the area. Several corridors remain intact and the associated soils are being evaluated to determine if additional IMs or remedial actions are necessary. Construction of the ET Cover System will eliminate this transport mechanism.
- Groundwater is the primary contaminant transport mechanism from the LOSA and Adjacent Features, as it is for all areas of the former Smelter site. Contaminants in groundwater from upgradient areas of the site migrate through the LOSA and additional contaminant mass is leached to groundwater by infiltration of precipitation through the LOSA vadose zone and as a result of fluctuations in the water table. Implementation of the SPHC IM is expected to reduce contaminant mass contributed from upgradient areas, and as noted

above, installation of the ET Cover System will address any potential leaching of metals from LOSA and Adjacent Features soils.

- Stormwater runoff is a contaminant transport mechanism when the runoff comes in contact with contaminated surface soils and picks up particulate. In order to address this mechanism and prevent transport, the stormwater is contained on site, and collected and treated. Stormwater runoff and sediment sample results indicate their potential to pose as sources of contamination. As a result, the LOSA and Adjacent Features are currently graded and runoff is conveyed to the HDS water treatment plant. Once treated, effluent from the HDS water treatment plant is discharged into Lower Lake. Potential installation of the CAMU 3 and planned construction of the ET Cover System over the area will eliminate runoff as a concern because ensure that precipitation will only contact clean surface soils.
- Deposition of windblown particulate is a potential migration pathway, but is and will continue to be actively managed during IM implementation. Dry, disturbed, uncovered, or unvegetated surface soil particles can be picked up by wind. The majority of the area is covered, and with the installation of the ET Cover System, windblown dust is a less-significant transport mechanism.

3.4 Conceptual Site Model for East Bench

This section presents the CSM for the East Bench.

3.4.1 Background and Historical Sources of Contamination

No historical smelter operations, other than the Air Liquide plant, which supplied liquid oxygen used in smelting operations for a number of years, are known to have occurred on the East Bench parcels (Figure 3-14).

The eastern parcel, or Parcel 17, has been used for agricultural purposes, and as a disposal area for soils excavated from residential properties and public areas as part of remedial actions conducted under the CERCLA East Helena Superfund Site soils removal required by the Administrative Order on Consent 1990, and the *Operable Unit No. 2, Residential Soils and Undeveloped Lands, Final Record of Decision* (USEPA, September 2009, referred to as the OU-2 ROD). ASARCO referred to the larger area that received contaminated soils, which extends east of Highway 518, as the East Fields Soil Repository. The westernmost part of the soil repository corresponds to the northern portion of Parcel 17 and is referred to as West Fields. The northern portion of Parcel 17 that received soils between 1996 and 2000 is known as West Field Direct Haul Area, and the southern portion of Parcel 17 that received soils between 1991 and 1992 is known as West Field Disposal Area. The contaminated soils were blended into existing soils, capped (minimum 12 inches thick) and seeded in 1999-2000.

The western parcel, or Parcel 18, was a residential area with company housing for ASARCO employees, the Assistant Plant Manager, and the Plant Manager. Unlike Parcel 17, there are no known CERCLA soil disposal activities on Parcel 18. The employee housing and the Assistant Plant Manager's house were demolished in 2010. Demolition activities included abating asbestos, cleaning and donating all usable fixtures for recycling by Habitat for Humanity, removing and properly disposing of all household hazardous wastes, demolishing all structures to grade, and backfilling basements with clean fill. Demolition debris was also properly disposed of offsite. Surface soils were disturbed and regraded during demolition activities; however, no soil removal or remediation was conducted. The Custodial Trust held preliminary discussions regarding the potential future reuse of the former ASARCO Manager's House as part of site redevelopment evaluations; unfortunately, the house was destroyed on August 24, 2012, by a fire sparked by downed power lines and spread with high winds. The remaining outbuildings of the ASARCO Manager's House are slated for demolition in 2013.

As part of the SPHC IM, realignment of PPC is proposed to expand the floodway/floodplain within the creek channel farther to the east in Parcel 18. On the north end of the East Bench, the west bank of PPC currently abuts the slag pile and stream flows erode the slag which is transported downstream. The proposed realignment of PPC will move the creek away from the slag pile. This will require significant areas of excavation and will also result in the removal of surficially contaminated soils. The realignment is within the AOC approved by USEPA in their conditional approval of the IM Work Plan 2012 (August 28, 2012), allowing soils to be consolidated on the former Smelter site, under the ET Cover System.

The Custodial Trust is evaluating options for integrating future potential land use into the interim measures. The community has expressed interest in using portions of Parcel 18 for public uses, including parks and open space, and designating the abutting area along PPC as a ‘green corridor’ for recreational use. Soils in this area will also be disturbed by the proposed City of East Helena water line relocation (Parcel 17, just west of Highway 518), and construction of the PPC Temporary Bypass. During these activities, available soil data will be used to develop appropriate safety measures for site workers and work will be conducted to minimize disturbance below the cap at West Fields.

The historical sources of contamination for the East Bench are summarized as follows (Figure 3-15):

- Most of the East Bench area is immediately downwind of the former Smelter site. Until the Smelter closed in 2001, stack emissions were a source of contaminant migration to the area through windborne deposition.
- No ASARCO operations or CERCLA-related soil disposal activities were known to have occurred on Parcel 18. Therefore, any impact is expected to be confined to surface and near-surface soils (to depths of 2 to 3 feet) only. Limited sampling to date has confirmed this.
- The West Fields area of Parcel 17 has been affected historically through airborne particulate deposition and by CERCLA-related soil disposal activities. Although no data of deeper soil samples are available, at locations where samples were collected down to 30 inches bgs, the concentrations decreased by several factors between the surface (0 to 16 inches bgs) and deeper samples (16 to 30 inches bgs). This also suggests the impact is likely confined to surface and near-surface soils only.

Data from monitoring wells installed immediately east of PPC indicate that groundwater beneath the East Bench is not impacted by the former Smelter site contamination. This is consistent with the observed groundwater flow direction, which is to the north-northwest, and with data that show the PPC acting as a hydraulic barrier to any contaminant migration. PPC is expected to continue to provide a hydraulic barrier even after the proposed realignment is completed.

3.4.2 Soil Contamination

Limited soil investigations have been conducted at the East Bench to date. At and near Parcel 18, soil samples down to depths of 3 to 5 feet bgs were collected at five sampling locations (in 2001 and 2010) and two borings were completed as monitoring wells (in the mid-1980s) (Figure 3-14). The results are presented in Appendix B and summarized as follows:

- Arsenic in surface and shallow soils was detected at concentrations above the SLVs for residential and industrial land uses and protection of groundwater, and above the ecological SLVs for invertebrates, wildlife, and terrestrial plants. Arsenic was detected below the risk-based concentration of 794 parts per million (ppm) identified in USEPA’s OU-2 ROD for recreational use. The concentrations would decrease by several factors, usually within the first few feet of ground surface.
- Cadmium in surface and shallow soils was detected at concentrations below the SLV for industrial land use, but depending on location above the SLV for residential land use, and above SLVs protective of groundwater. Cadmium was also detected at concentrations below the ecological SLV for invertebrates, depending on location above the SLV for terrestrial plants, and in all cases above the SLV for wildlife. The concentrations would decrease, usually within the first few feet of ground surface.
- Lead was detected at concentrations above the SLVs for residential and industrial land uses and protection of groundwater in the majority of surface and shallow soils. The lead concentrations also exceeded the ecological SLVs for invertebrates, terrestrial plants, and wildlife in the majority of surface and shallow soils. At a few locations, particularly the northern portion, the concentrations were below the SLV for residential land use, and the ecological SLV for invertebrates. The concentrations are observed to decrease, usually within the first few feet of ground surface.
- Selenium in surface and shallow soils was detected at concentrations below the SLVs for residential and industrial land use, but above the SLV for protection of groundwater. The selenium concentrations also

exceeded the ecological SLVs for terrestrial plants and wildlife, but were generally below the SLV for invertebrates. The concentrations would decrease with depth, and in several samples even to below the detection limits; note, however, that the detection limits were greater than the SLV that would be protective of groundwater, and generally greater than the ecological SLVs for plants and wildlife.

At West Fields, the CERCLA-related excavated soils were placed within designated grids, for ease of tracking and sampling, based on an alphanumeric system as shown in Figure 3-14. Once the soils were mixed, regrading of the soils occurred to achieve a soil cap thickness of approximately 12 inches, with lead concentrations below the action level of 1,000 mg/kg. Other remedial techniques known to have been employed at West Fields included lime amendment for pH adjustment and deep tilling to reduce metals concentrations.

The most recent data available for West Fields were of shallow (mostly 0 to 1 foot bgs, some down to 30 inches bgs) soil samples collected between 1996 and 2000. The samples were tested for a limited analyte suite: arsenic, cadmium, and lead. The results are presented in Appendix B and summarized as follows:

- Arsenic was detected at concentrations above the SLVs for residential and industrial land uses and protection of groundwater.
- Cadmium was detected at concentrations below the SLVs for residential and industrial land uses, but above the SLV for protection of groundwater. Cadmium concentrations exceeded the ecological SLV for wildlife, depending on location exceeded the SLV for plants, and were below the SLV for invertebrates.
- Lead was detected at concentrations above the SLVs for residential land use and protection of groundwater, and with a few exceptions above the industrial land use SLV. Lead concentrations exceeded the ecological SLVs established for wildlife and plants, but were generally below the SLV for invertebrates.
- No data were available for selenium.

The West Fields have undergone reworking of soils over time such that previous samples collected in the 1988-89 timeframe and then again after treatment (tilling and regrading) in the 1996-2000 timeframe may not be representative of current conditions. Additional data will be collected if needed to support implementation of IMs and final remedies in this area.

3.4.3 Groundwater Contamination

None of the data collected to date indicate that groundwater east of PPC has been affected by the former Smelter site operations or from migration of contamination. Arsenic and selenium concentrations in both wells (DH-7 and DH-11) located east of PPC were either below or near their detection limits, since the wells were installed in January 1985. With few exceptions, arsenic concentrations in well DH-11 were below its SLV of 0.01 mg/L, and this remained the case since late 2001; for all samples, selenium concentrations in the well were below its SLV of 0.05 mg/L. With the exception of the initial arsenic measurement in January 1985, arsenic and selenium concentrations in well DH-7, located just north of Parcel 18 near Highway 12, were below their respective SLVs. The data appear to be consistent with the observations indicating groundwater recharge from PPC creates a flow divide thus restricting the migration of any groundwater contamination from the former Smelter site toward the East Bench.

3.4.4 Contaminant Transport

The potential for contaminant transport from the East Bench to other areas is minimal when compared to areas of the former Smelter site. Preliminary CSMs have been developed for Parcels 10, 17, 18, and portions of Parcel 8 as part of initial Corrective Measures Study work planning and development, and these areas will be evaluated further during Corrective Measures Study implementation. The current understanding of potential transport mechanisms, and an overview of how they will be managed during IM implementation, is summarized as follows:

- Data collected to date suggests that the East Bench is not a pathway of concern for infiltration and leaching to groundwater. Contaminant concentrations and mass are significantly lower in this area, and monitoring data show no significant effects on groundwater quality.

- Surface water runoff is a potential contaminant transport mechanism, given the levels of inorganic contaminants in surface soils. Construction activities performed on the East Bench will include stormwater management measures to minimize erosion and prevent stormwater runoff to other areas.
- Airborne particulate deposition is a potential transport mechanism because of the levels of inorganic contaminants in surface soils. Dust control measures will be implemented during construction, and haul routes will be designed to keep construction vehicles inside the AOC boundary, minimizing the potential for vehicles to "track out" contaminants.
- An additional potential contaminant transport pathway is that of soil and soil invertebrate ingestion by migratory birds.

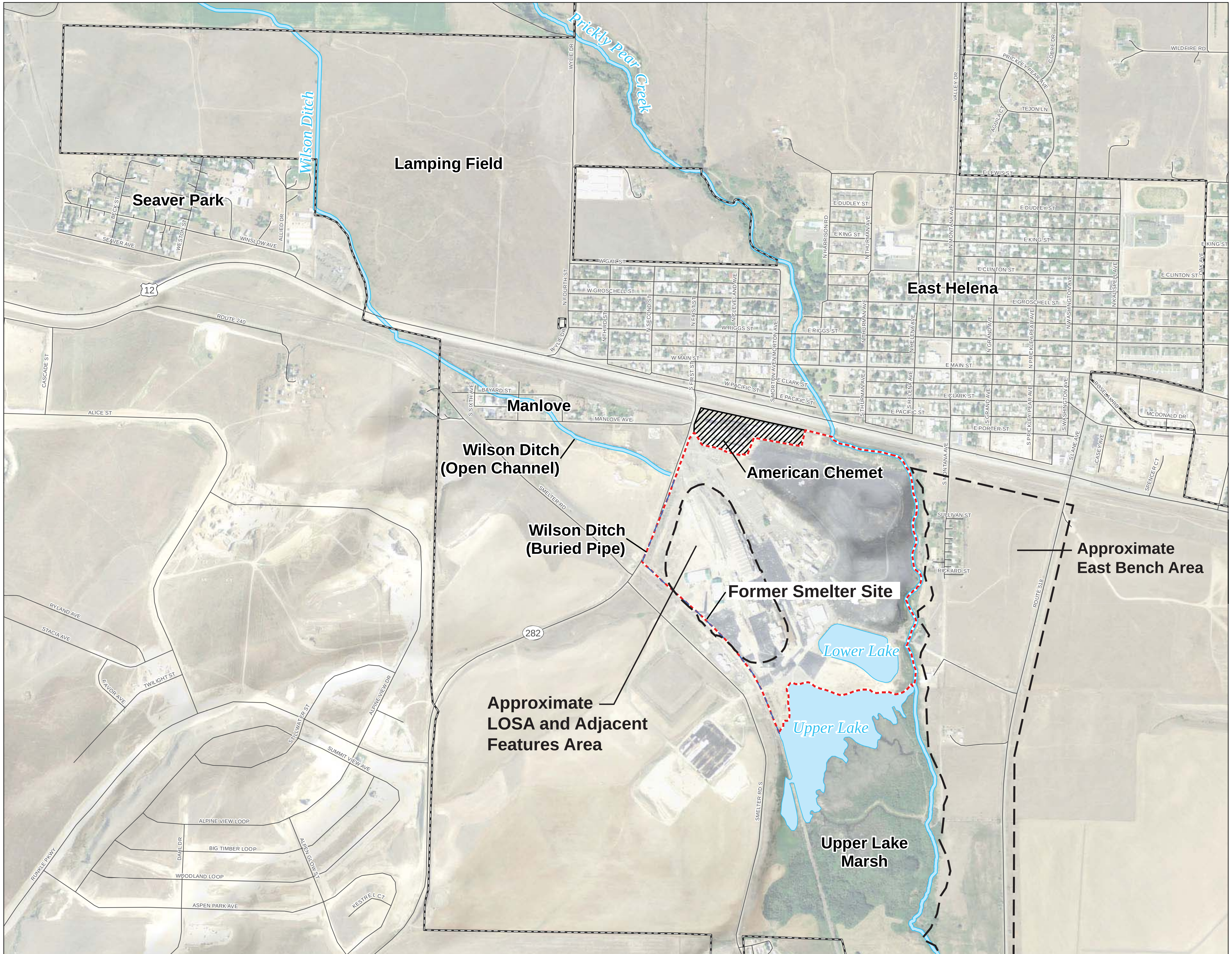


FIGURE 3-1
Site Vicinity
Interim Measures Work Plan–2013
East Helena, Montana

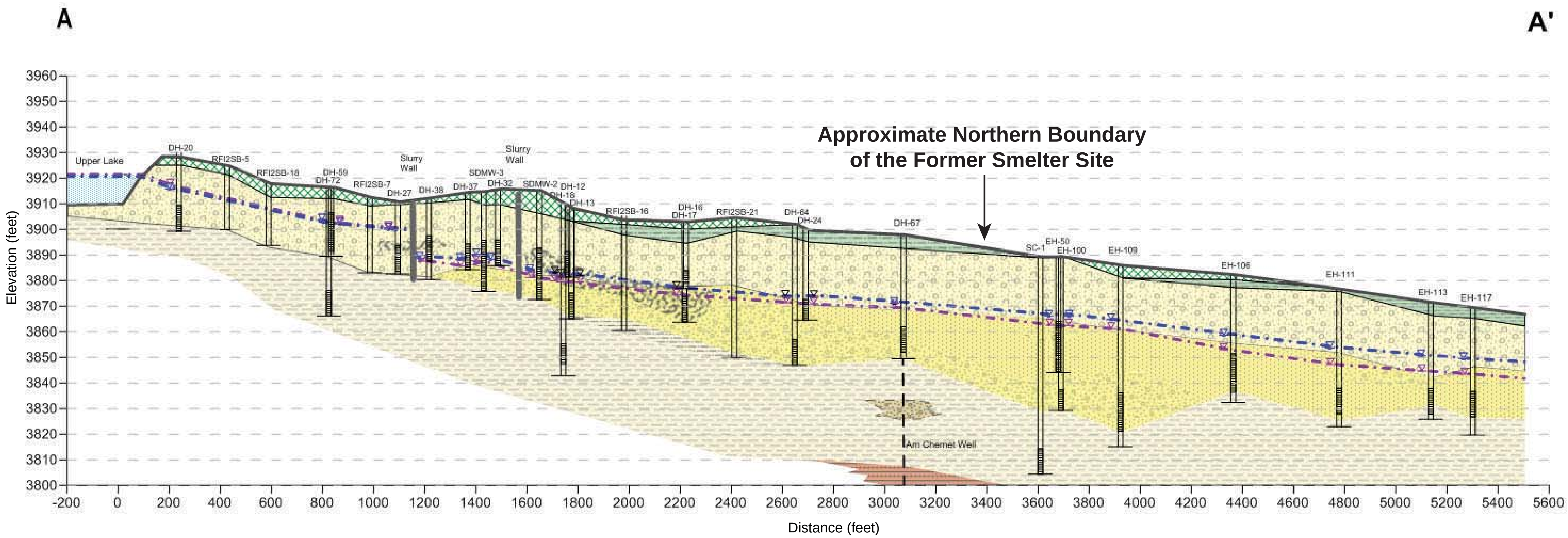
CH2MHILL.

Modified from the Phase II RFI Report.

MAP NOTES:
Date: May 12, 2011
Data Sources: Hydrometrics, USGS, Lewis and Clark County GIS, ESRI

GSI Water Solutions, Inc.

FIGURE 3-2
Geologic Cross Section A-A'
Interim Measures Work Plan–2013
East Helena, Montana



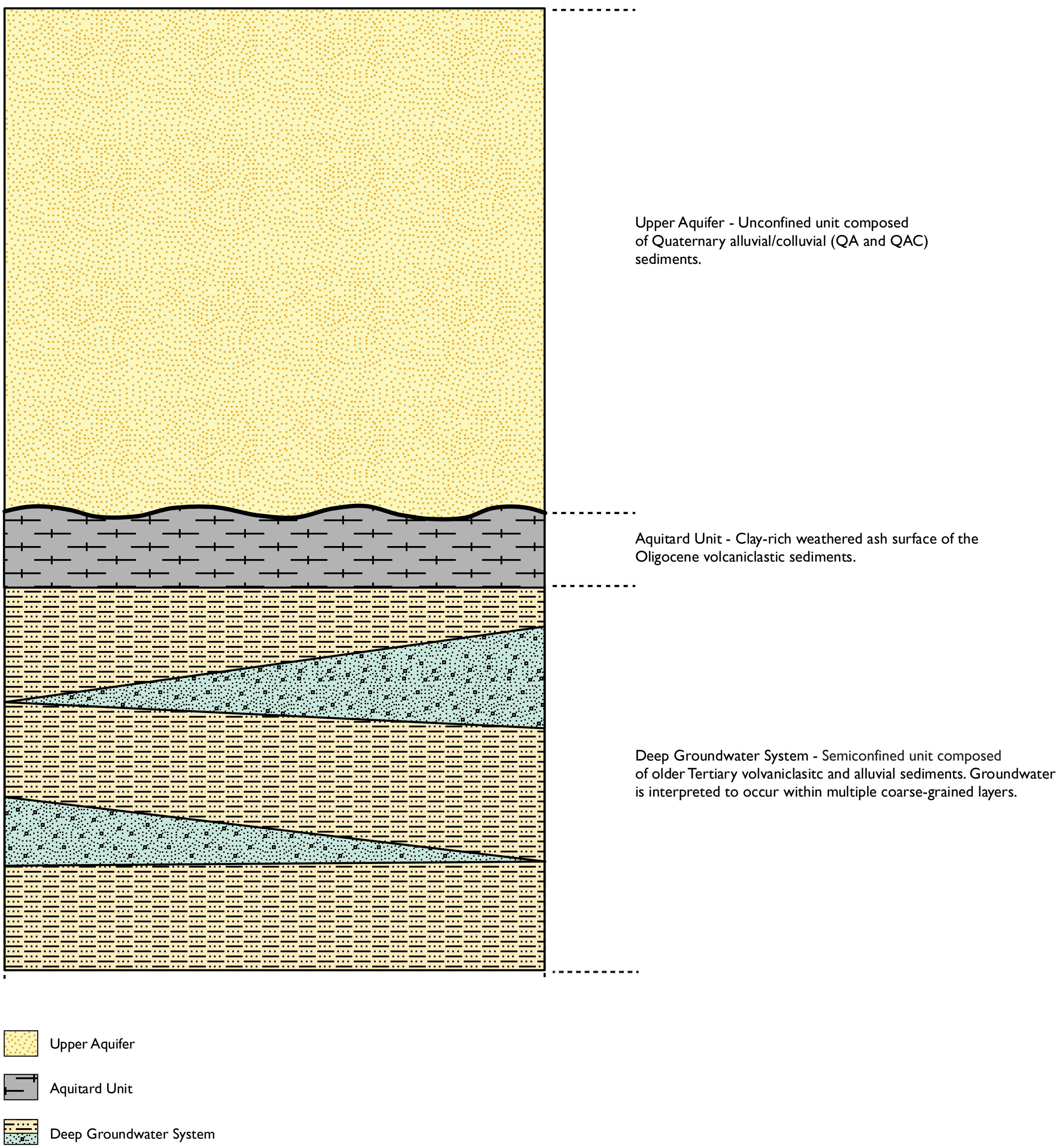
LEGEND
- Slag
- Fill
- Holocene Silt
- Holocene Organic Silt (marsh/wetland sediments)
- Quarternary Sand & Gravel
- Quarternary/Tertiary Sand
- Quarternary/Tertiary Silty Sand & Gravel
- Undifferentiated Tertiary Silt, Silty Sand & Silty Gravel
- Tertiary Volcaniclastic Sediment Unit (weathered and/or reworked ash tuffaceous sedimentary deposits)
- Tertiary Interlayered F. Sand & Volcaniclastic Silt/Clay
- Tertiary Sand & Gravel
- "Burnt Shale" (as described in drillers log, indurated clay or argillite of the Spokane Formation)
- Hydrocarbon Stained Soils
- June 2010 Static Water Level
- October 2010 Static Water Level

CH2MHILL.

Modified from the Phase II RFI Report.

GSI Water Solutions, Inc.

Reference: Hydrometrics, 2011, unpublished work



Modified by CH2M HILL from the *Draft Flow Model Design and Calibration, East Helena Site, Technical Memorandum* dated August 20, 2012.

FIGURE 3-3
Conceptual Hydrostratigraphic Column
Interim Measures Work Plan–2013
East Helena, Montana

LEGEND

- PPC-8 Stream Gage
- Diversion
- Tributary/Outfall
- Gain (flow)
- Loss (flow)
- October 2010 Water Level Contours

All Other Features

- East Helena City Limits
- Slurry Wall and Cap
- Roads
- Surface Water Features

A to D Reaches of Wilson Ditch

1 to 13 Reaches of Prickly Pear Creek

MAP NOTES:

Data Sources: Hydrometrics, USGS, Lewis and Clark County GIS

Modified from the Phase II RFI Report.

N

0 875 1,750 2,625

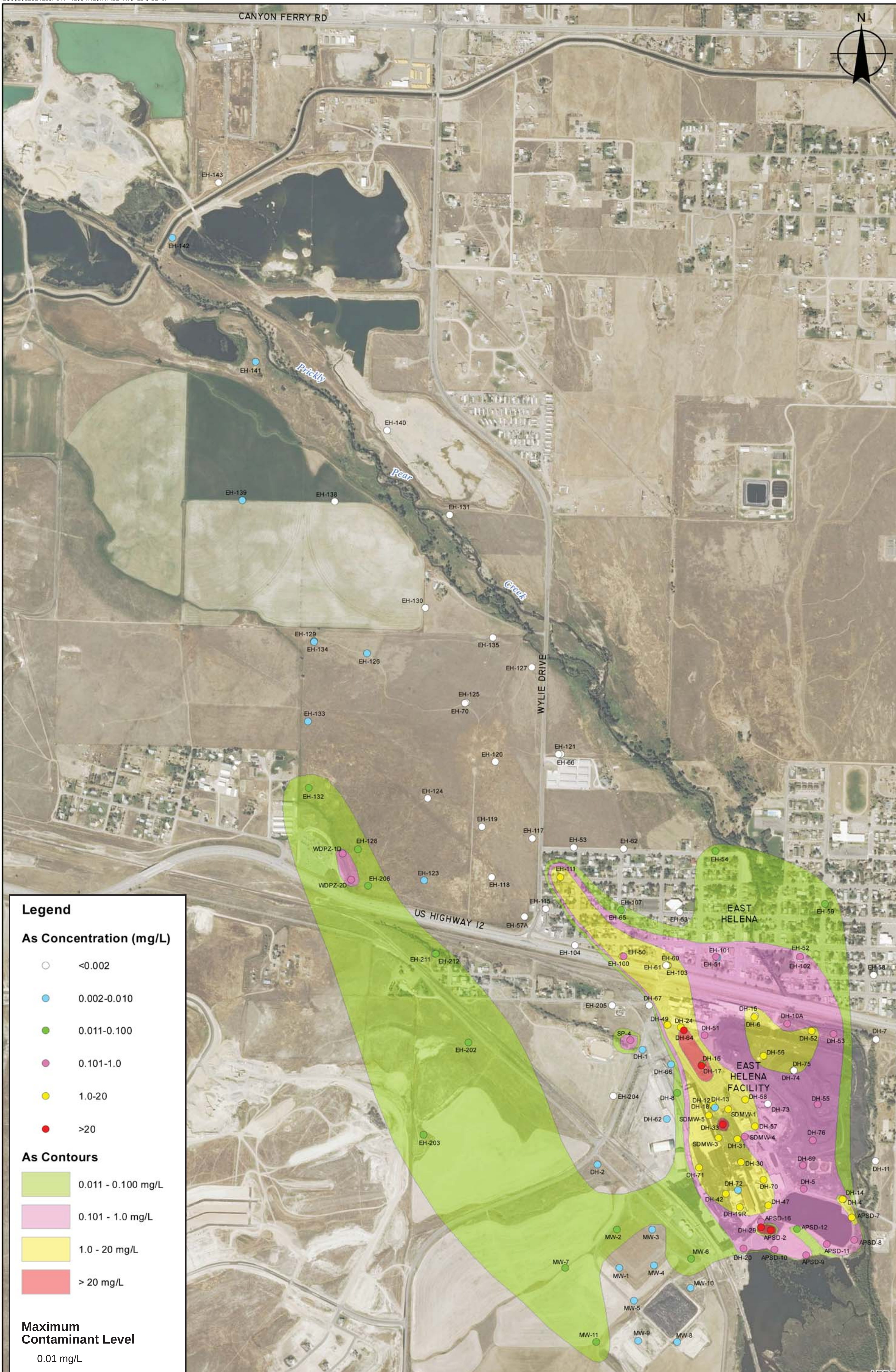
Feet

CH2MHILL.

GSI Water Solutions, Inc.

FIGURE 3-4
Water Level Elevations and Streamflow Gain/Loss
Interim Measures Work Plan–2013
East Helena, Montana

ES032612024219PDX 420947.15.WP.12 Rv5 11-5-12 lh



Hydrometrics, Inc.
Consulting Scientists and Engineers

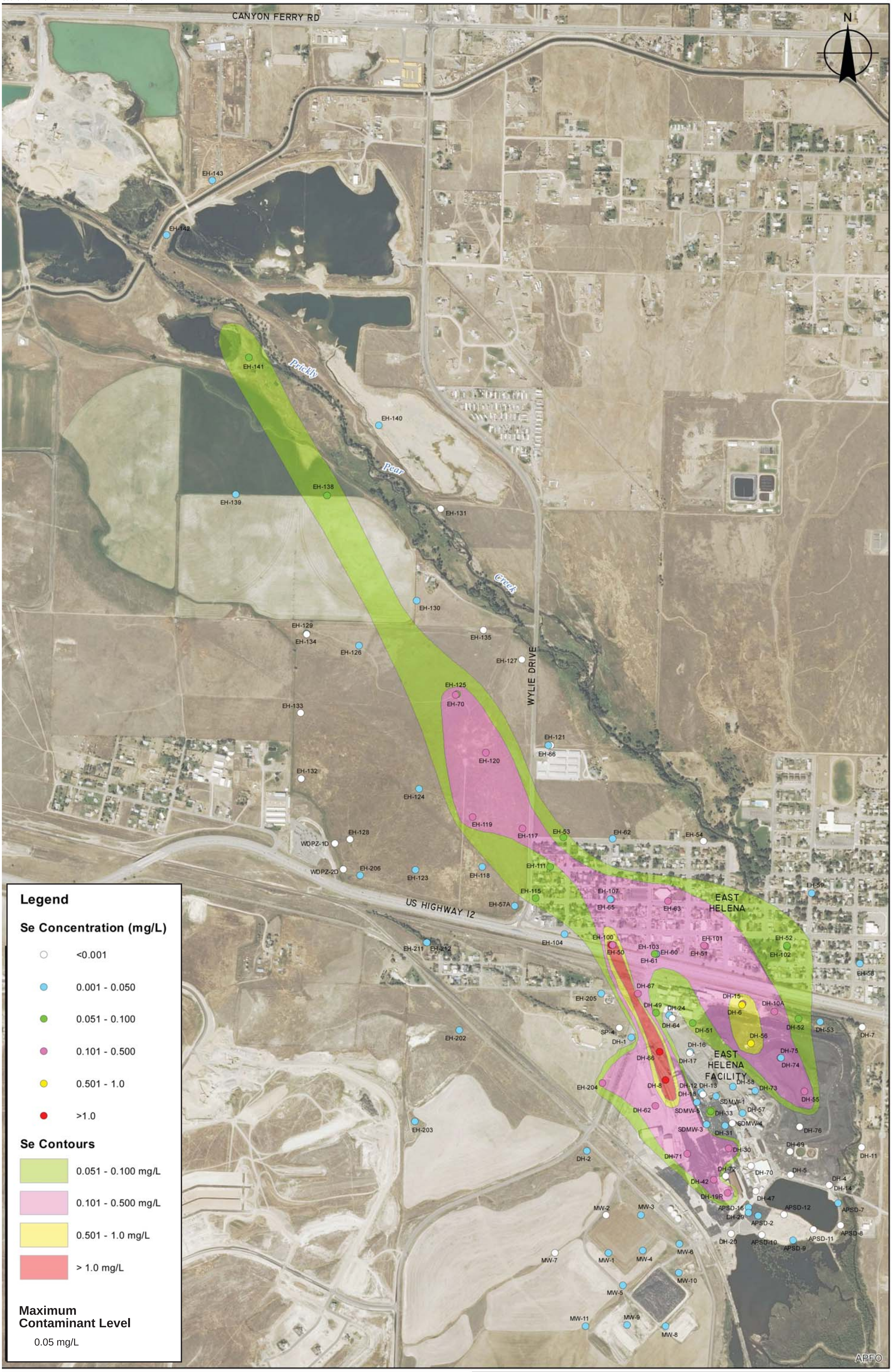
Date Saved: 10/17/2012 2:15:30 PM

Path: V:\10022\GIS\Plume Maps\IMWP Plume Files\As_Sept2011_Plume.mxd

0 500 1,000 2,000

Scale in Feet

FIGURE 3-5
Dissolved Arsenic Concentrations in Groundwater—September 2011
Interim Measures Work Plan–2013
East Helena, Montana



Hydrometrics, Inc.
Consulting Scientists and Engineers

Date Saved: 10/17/2012 2:14:39 PM

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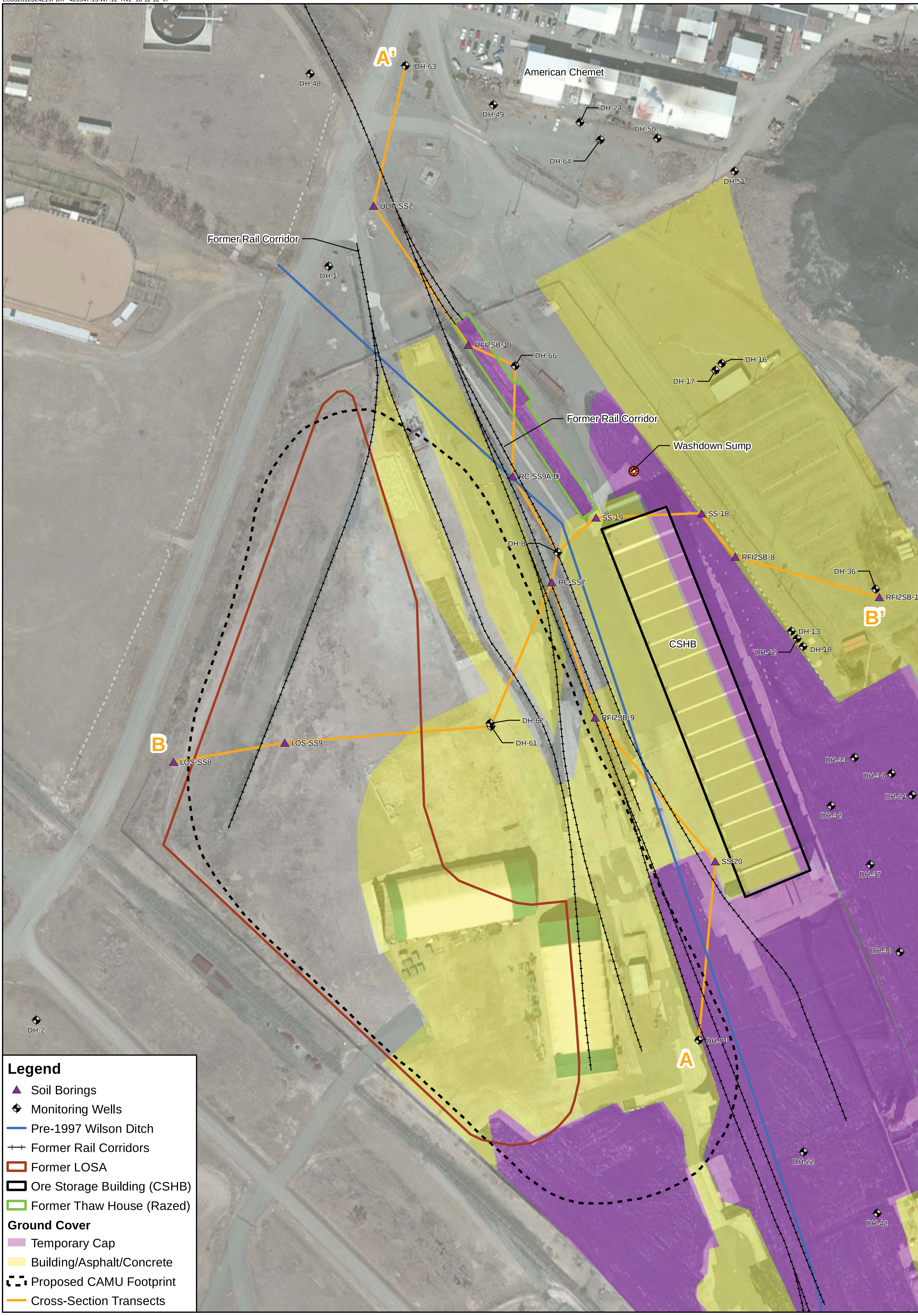
0 500 1,000 2,000

Scale in Feet

FIGURE 3-6
Dissolved Selenium Concentrations in Groundwater—September 2011
Interim Measures Work Plan–2013
East Helena, Montana



Notes:
1) CSHB - Concentrate Storage and Handling Building
2) LOSA - Lower Ore Storage Area
3) CAMU - Corrective Action Management Unit

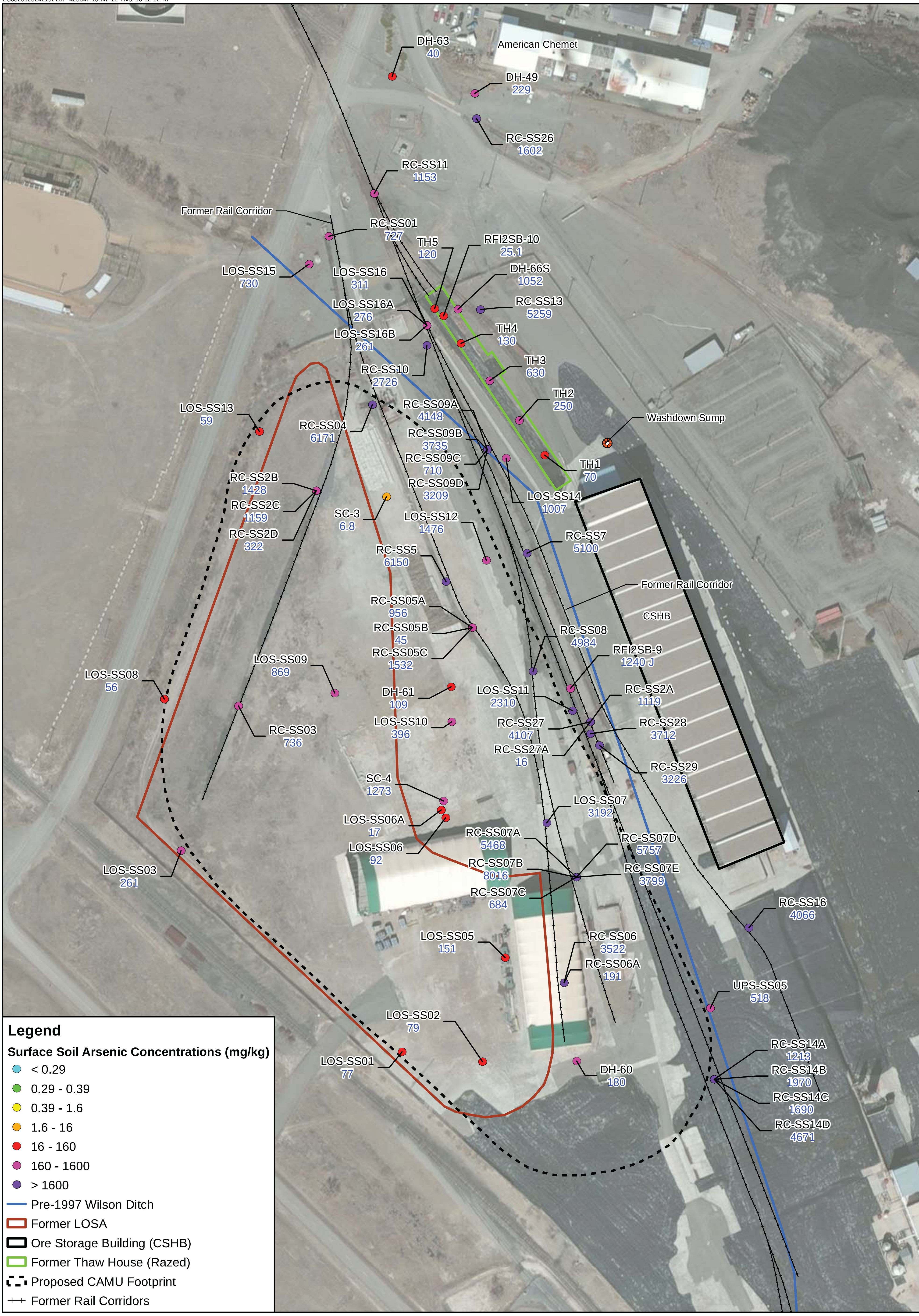
0 150 300
Scale in Feet

N

FIGURE 3-7
LOSA and Adjacent Features
Interim Measures Work Plan–2013
East Helena, Montana

CH2MHILL. Modified from Hydrometrics, Inc., 9/24/2012

R:\GIS\DEN\Montana_Environmental_Trust_Project\GIS\MapFiles\CSM_Fig1.mxd gtwigg 10/4/2012 2:12:25 PM



Screening Level Values:
Groundwater Protection - 0.29 mg/kg
Residential - 0.39 mg/kg
Industrial - 1.6 mg/kg
Background - 17 mg/kg

Notes:
1) CSHB - Concentrate Storage and Handling Building
2) LOSA - Lower Ore Storage Area
3) CAMU - Corrective Action Management Unit
4) J - the value is estimated
5) mg/kg - milligrams per kilogram
6) At locations with multiple samples, the highest concentration is displayed.

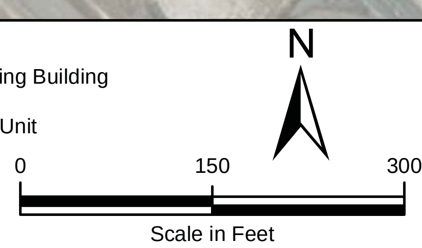
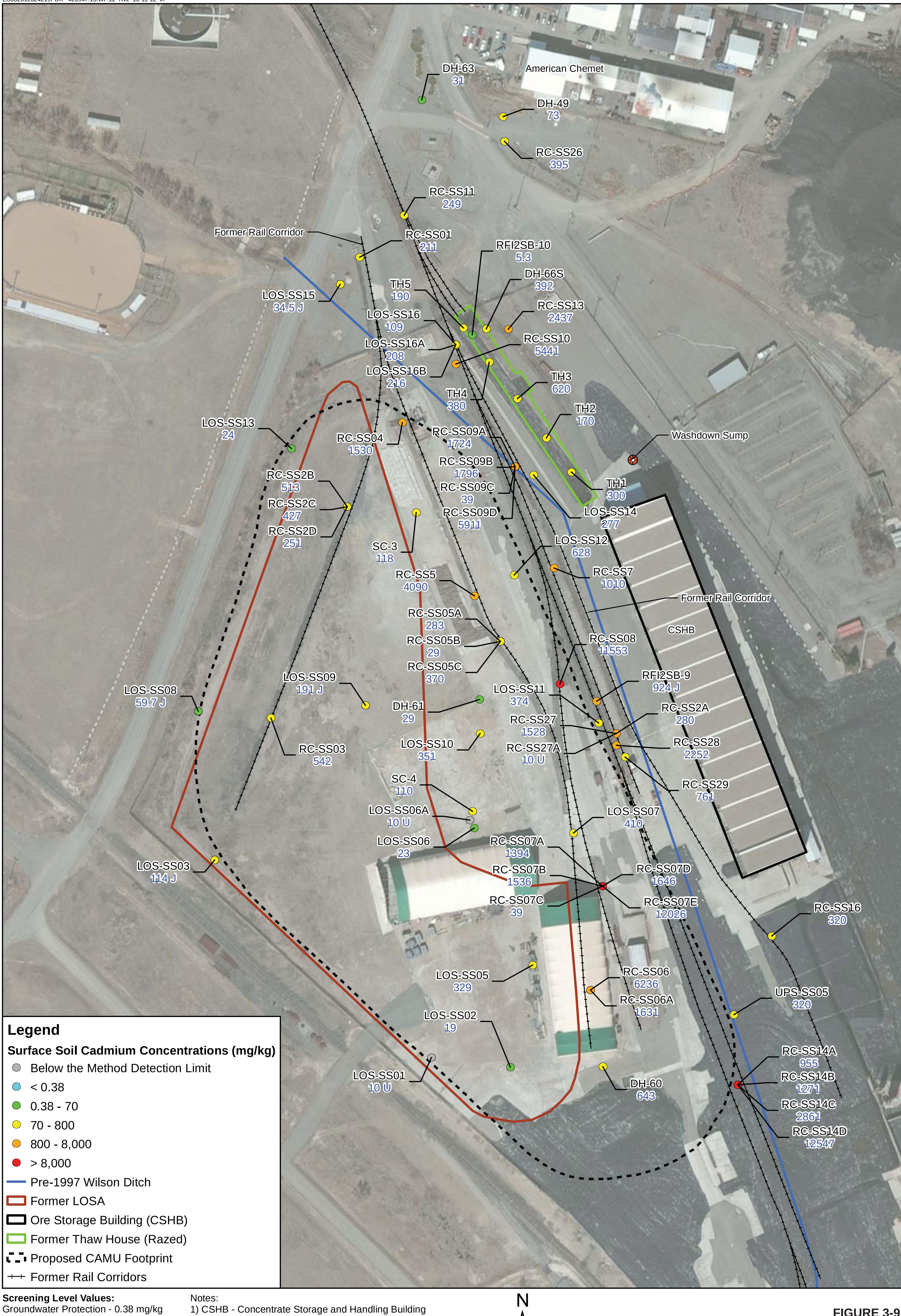


FIGURE 3-8
Arsenic Concentrations in Surface Soils
Interim Measures Work Plan–2013
East Helena, Montana



Screening Level Values:
Groundwater Protection - 0.38 mg/kg
Residential - 70 mg/kg
Industrial - 800 mg/kg
Background - 0.24 mg/kg

Notes:
1) CSHB - Concentrate Storage and Handling Building
2) LOSA - Lower Ore Storage Area
3) CAMU - Corrective Action Management Unit
4) J - the value is estimated
5) U - the metal was not detected
6) mg/kg - milligrams per kilogram
7) At locations with multiple samples, the highest concentration is displayed.

FIGURE 3-9
Cadmium Concentrations in Surface Soils
Interim Measures Work Plan–2013
East Helena, Montana

CH2MHILL. Modified from Hydrometrics, Inc., 9/26/2012

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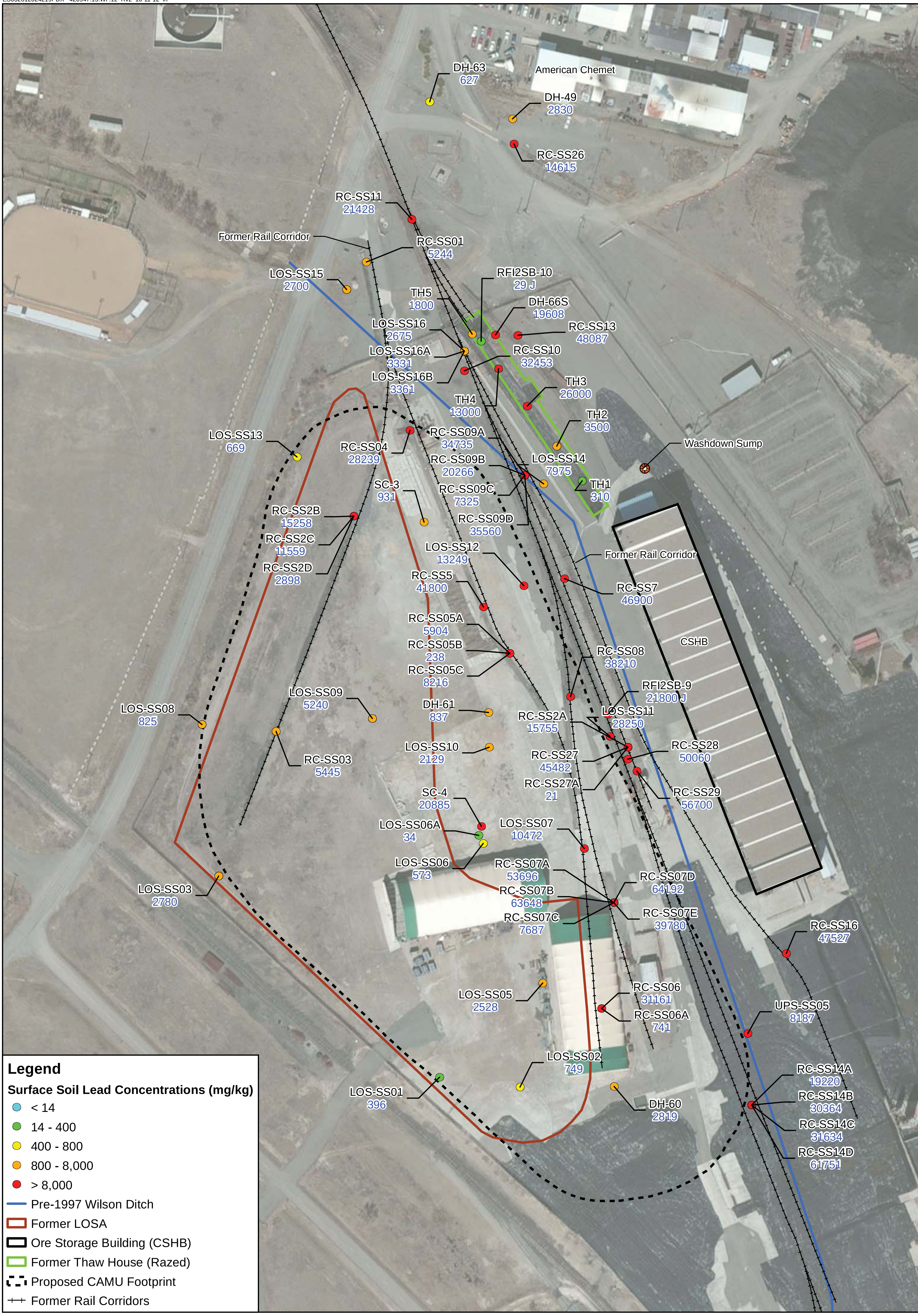
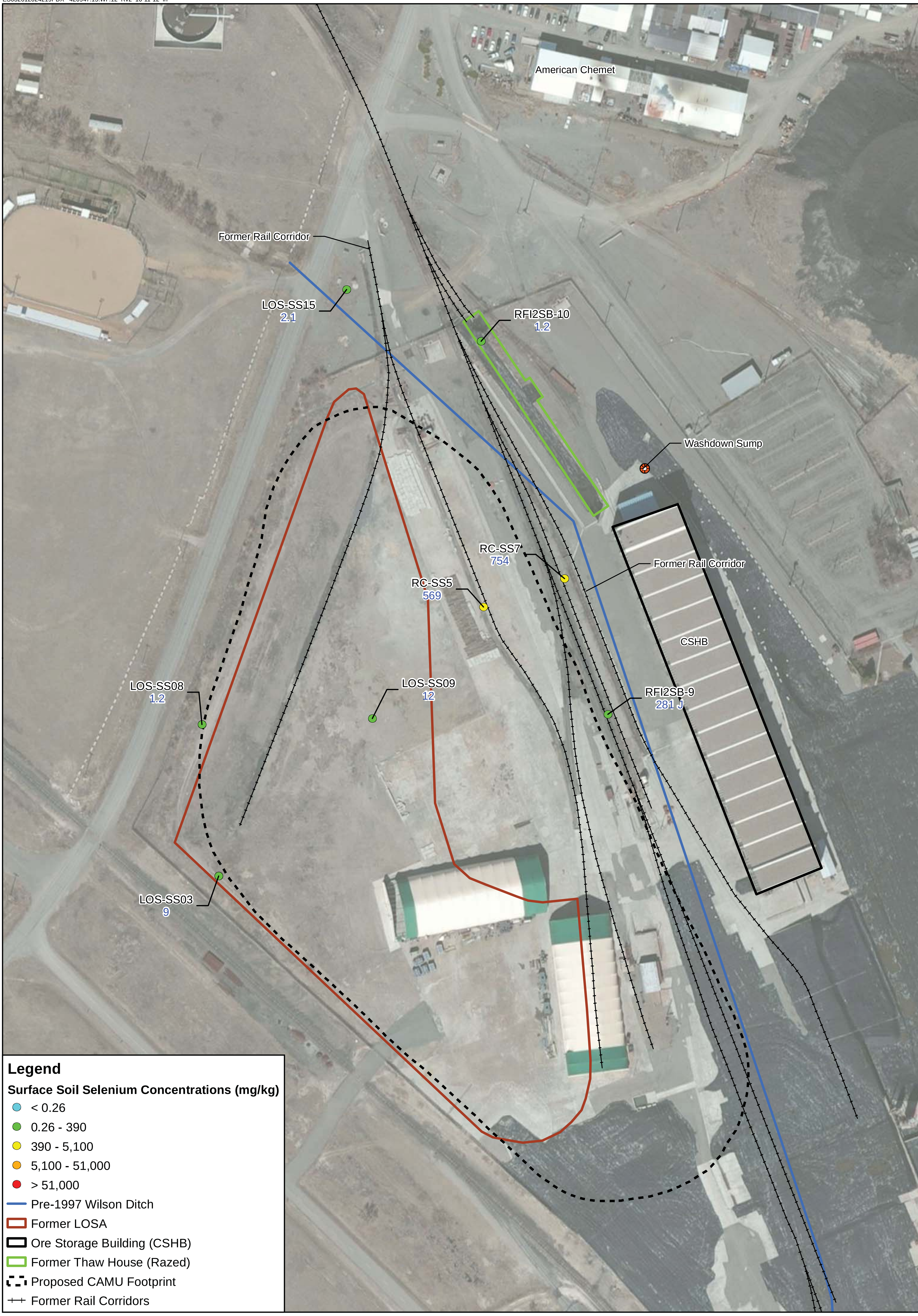


Screening Level Values:
Groundwater Protection - 14 mg/kg
Residential - 400 mg/kg
Industrial - 800 mg/kg
Background - 12 mg/kg

Notes:
1) CSHB - Concentrate Storage and Handling Building
2) LOSA - Lower Ore Storage Area
3) CAMU - Corrective Action Management Unit
4) J - the value is estimated
5) mg/kg - milligrams per kilogram
6) At locations with multiple samples, the highest concentration is displayed.

FIGURE 3-10
Lead Concentrations in Surface Soils
Interim Measures Work Plan–2013
East Helena, Montana

ES032612024219PDX 420947.15.WP.12 Rv2 10-11-12 lh



Screening Level Values:
Groundwater Protection - 0.26 mg/kg
Residential - 390 mg/kg
Industrial - 5,100 mg/kg
Background - 0.07 mg/kg

Notes:
1) CSHB - Concentrate Storage and Handling Building
2) LOSA - Lower Ore Storage Area
3) CAMU - Corrective Action Management Unit
4) J - the value is estimated
5) mg/kg - milligrams per kilogram

FIGURE 3-11
Selenium Concentrations in Surface Soils
Interim Measures Work Plan–2013
East Helena, Montana

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CH2MHILL. Modified from Hydrometrics, Inc., 9/26/2012

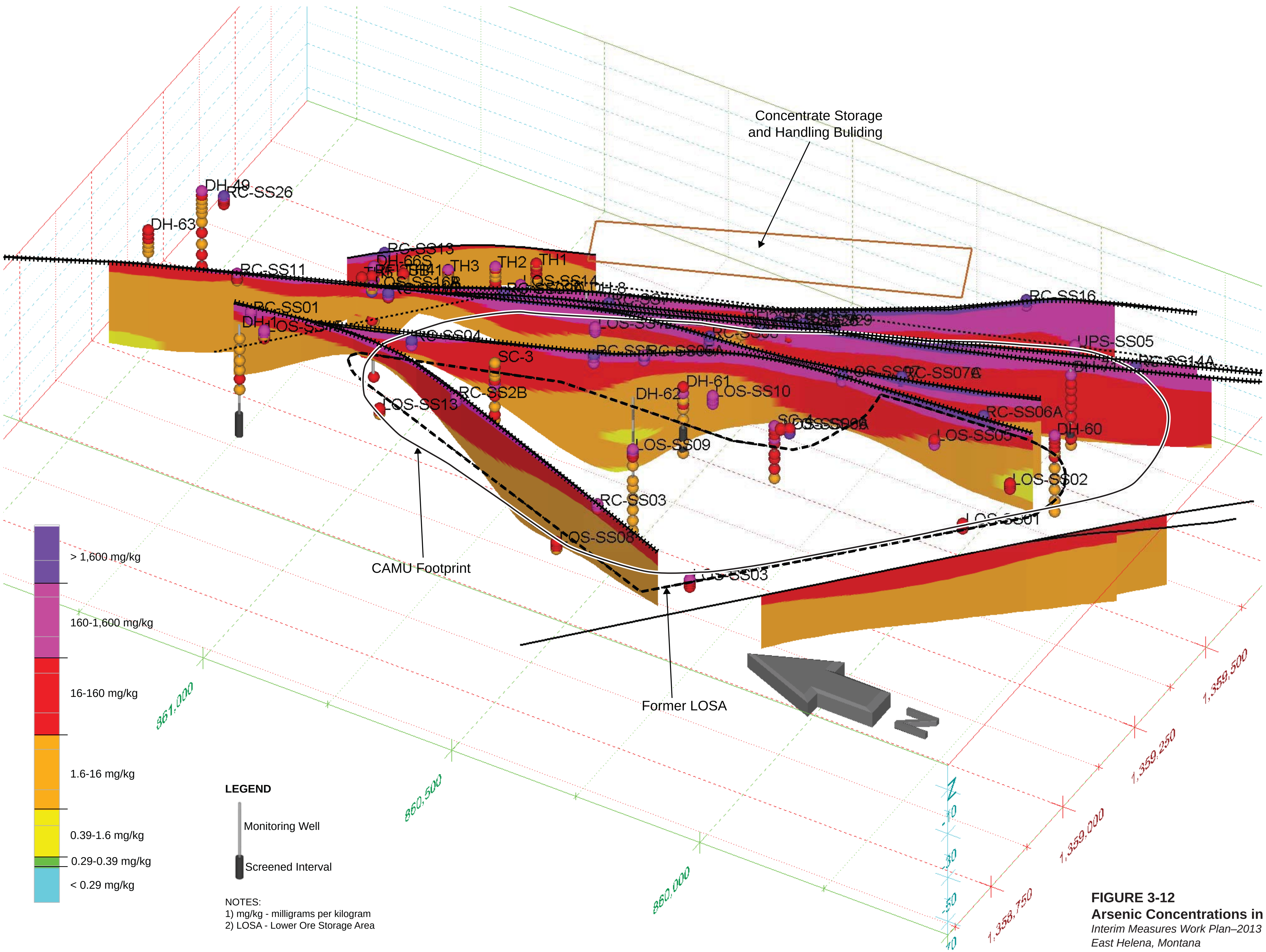

FIGURE 3-12
Arsenic Concentrations in Subsurface Soils
Interim Measures Work Plan–2013
East Helena, Montana

CH2MHILL.

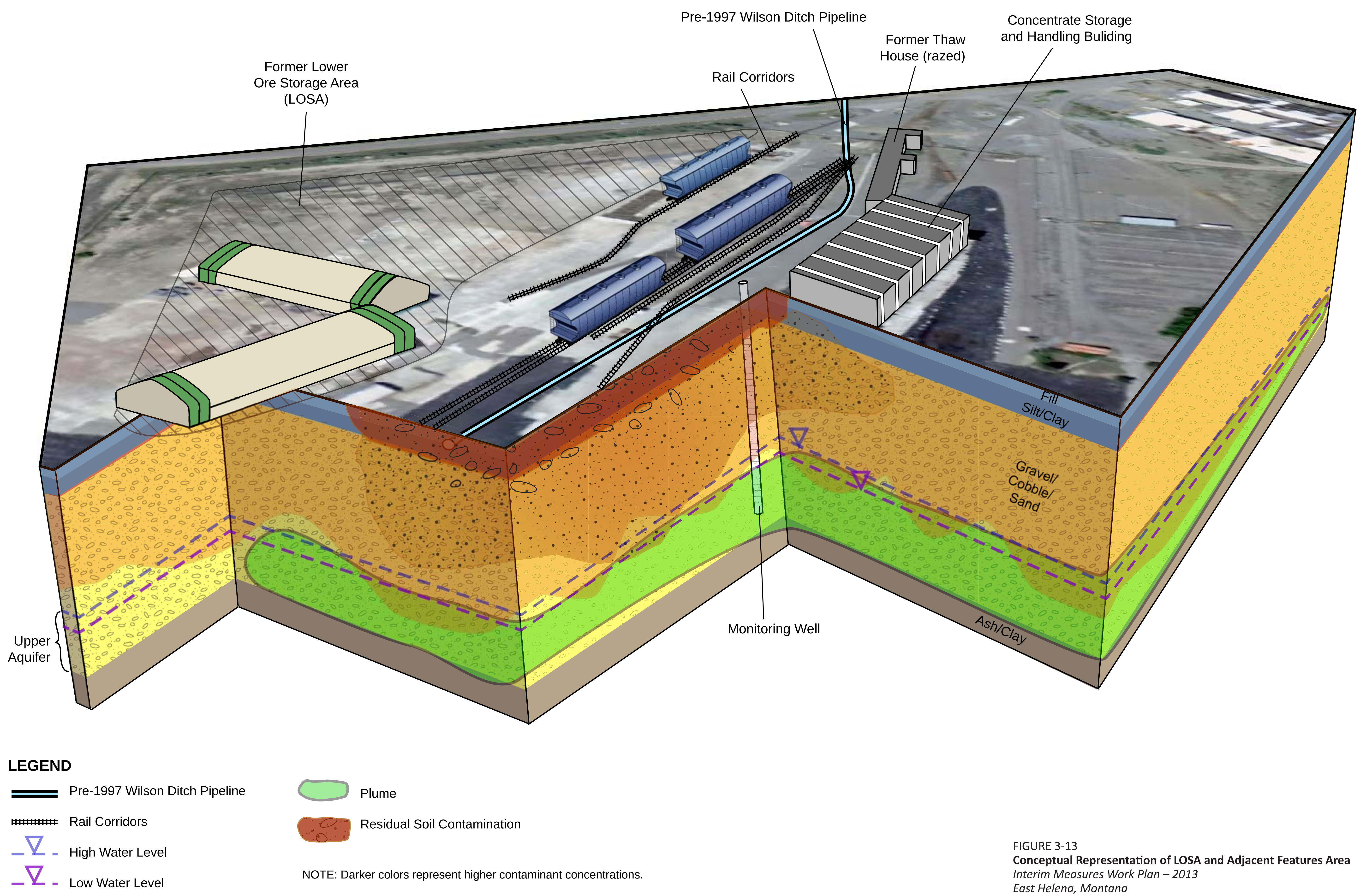

FIGURE 3-13
Conceptual Representation of LOSA and Adjacent Features Area
Interim Measures Work Plan – 2013
East Helena, Montana

CH2MHILL

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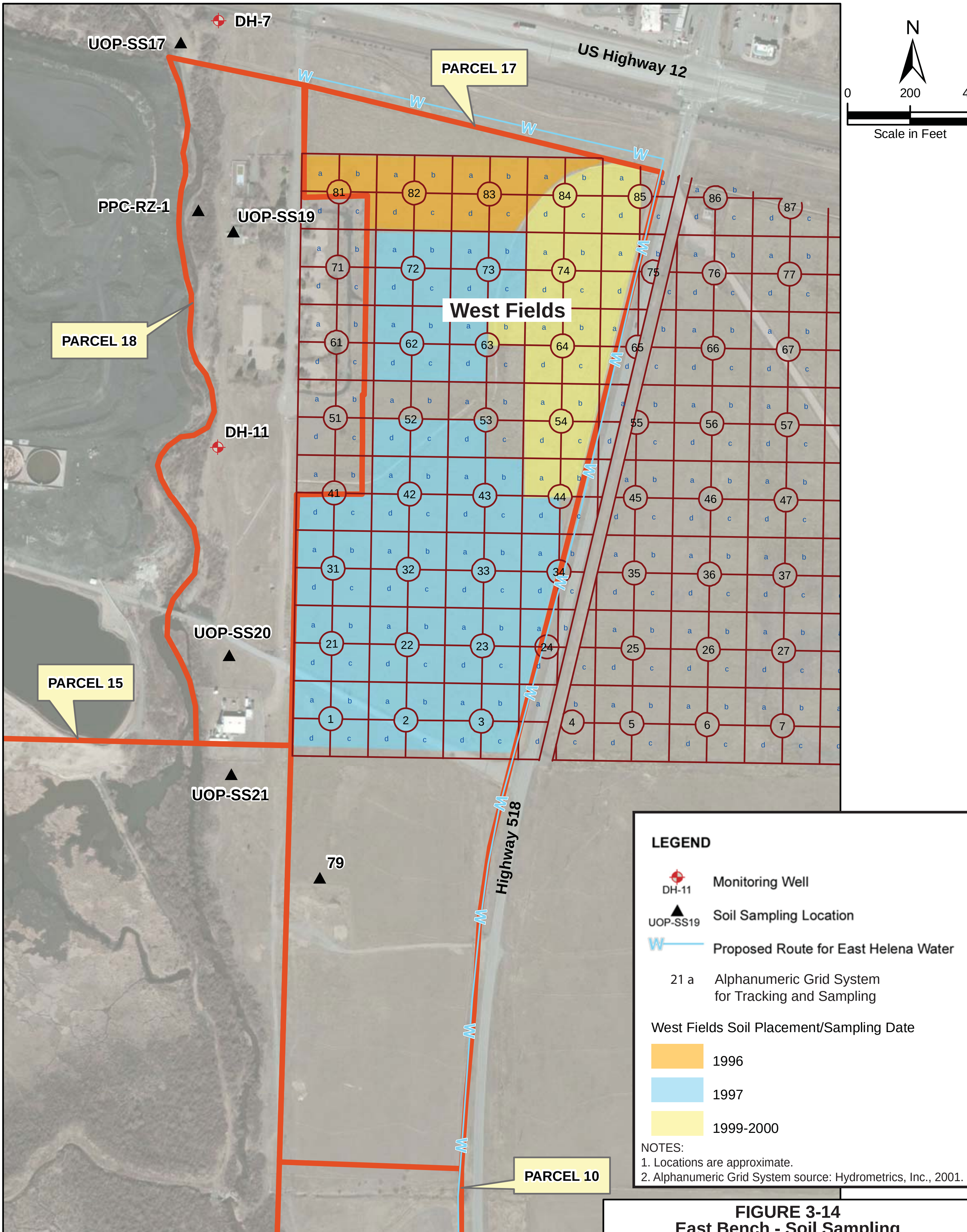
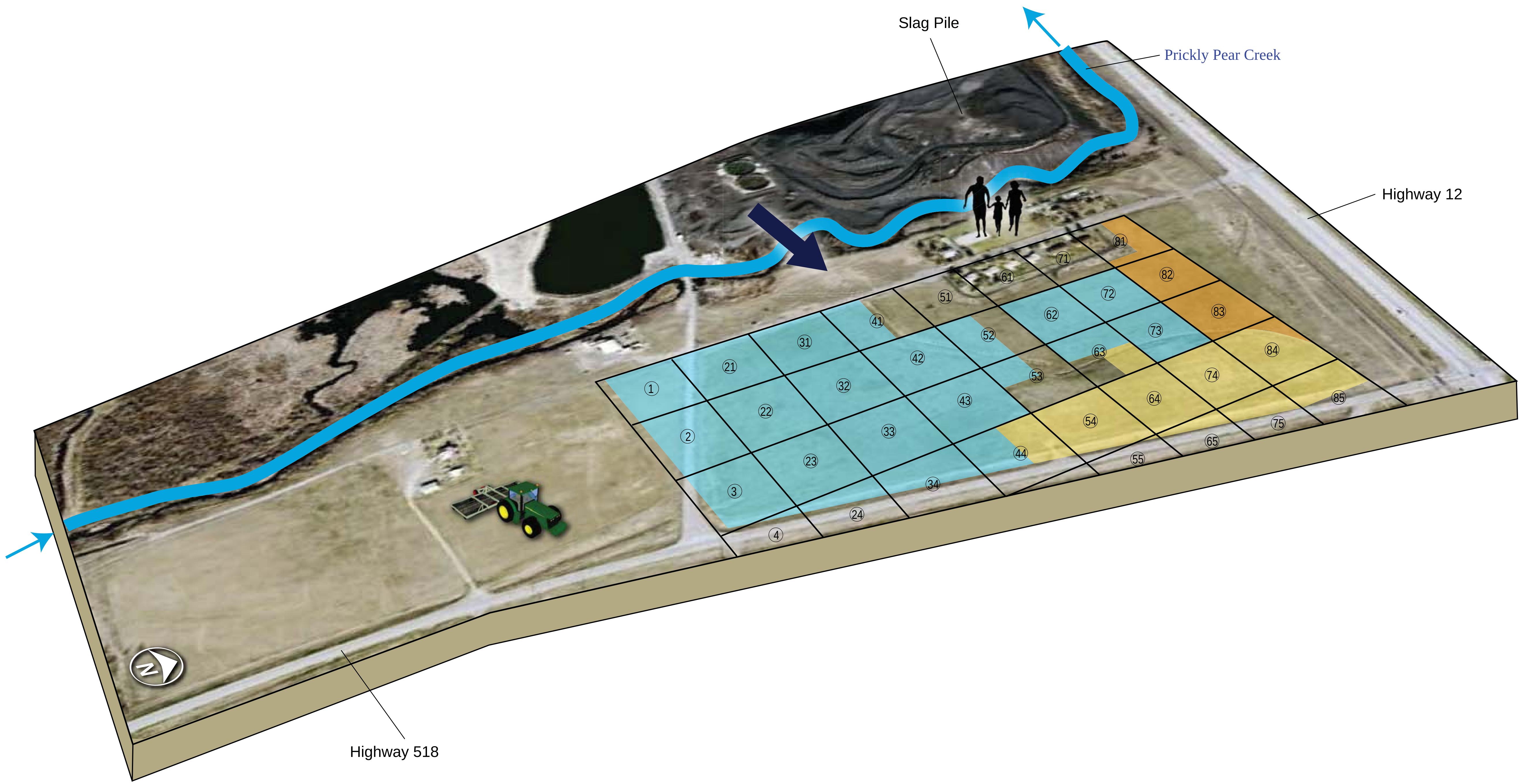


FIGURE 3-14
East Bench - Soil Sampling and Monitoring Well Locations
Interim Measures Work Plan–2013
East Helena, Montana

CH2MHILL.
Modified from Hydrometrics Source.



LEGEND

Potential Future Recreational Use

Agricultural Use

Historical Windblown Particulate Deposition

West Fields Soil Placement/Sampling Date

1996

1997

1999-2000

NOTES: 1. Locations are approximate.
2. Alphanumeric Grid System source: Hydrometrics, Inc., 2001.

FIGURE 3-15
Conceptual Representation of East Bench
Interim Measures Work Plan–2013
East Helena, Montana

CH2MHILL.

SECTION 4

Data Sufficiency

This section discusses the sufficiency of data needed for conceptual development of the IMs and design of the projects proposed for implementation in 2013. Included in this section are a summary of existing data and a list of potential data needs for the 2013 work.

4.1 Summary of Existing Data

A variety of data are needed to evaluate, design, and construct the work described in this IM Work Plan 2013. The current data collection status was originally presented in the IM Work Plan 2012. Updates relevant to the proposed 2013 work incorporate information collected and completed in the second and third quarters of 2012. Updates are summarized as follows:

- Hydrogeology—Ongoing. The draft Phase II RFI Report summarizes work conducted through 2010. Current groundwater conditions both at the former Smelter site and offsite are monitored at least quarterly by the Custodial Trust. This work is part of ongoing groundwater characterization efforts being implemented by the Custodial Trust. The plan for collection of groundwater and surface water samples in 2012 is summarized in the FSAP (Hydrometrics, 2012a). The additional data are expected to augment the current understanding of groundwater conditions. Data collected during the FSAP will be evaluated in conjunction with other activities at the former Smelter site, including the Upper Lake drawdown testing. Groundwater and surface water sampling will continue under an FSAP for 2013.
- Upper Lake Drawdown Test—Ongoing (see Appendix A for a technical memorandum presenting the results). As the critical component in quantifying the effectiveness of the SPHC IM, the removal and draining of Upper Lake is expected to eliminate a major source of recharge to groundwater and lower the hydraulic gradient for groundwater flow through the former Smelter site. Background monitoring and test data related to the drawdown of Upper Lake were collected between October 2011 and September 2012. The technical memorandum in Appendix A presents the results of the drawdown test. Results indicate that groundwater levels have declined by 5 feet or more, which would lower groundwater levels below the most highly contaminated soils. The decreased contact between groundwater and residual contaminated soils, coupled with the reduction in hydraulic gradients and groundwater flow rates through the former Smelter site, should result in reduced contaminant leaching to groundwater and reduced groundwater contaminant loading, and therefore reduced contaminant transport offsite.
- Stream flow—Completed for purposes of PPC Temporary Bypass design needs. Data are available from local sources.
- Soil chemistry—Completed for purposes of PPC Temporary Bypass design needs. Data are summarized in the draft Phase II RFI Report. Limited additional data may be needed in localized areas to support detailed engineering evaluation.
- Groundwater chemistry – Ongoing. The draft Phase II RFI Report summarizes work conducted through 2010 and groundwater monitoring pursuant to the annual FSAP provides updated information on a quarterly basis.
- Stormwater flows, chemistry and discharge data—Ongoing. Data are available from former Smelter site personnel operating the HDS water treatment plant, data collected as required under the Montana Pollutant Discharge Elimination System (MPDES) permit, and stormwater permits.
- Building inventory—Partially completed. Additional data are needed to support detailed engineering (see discussion that follows).
- Utility types and locations—Partially completed. Existing utility drawings and underground utility information obtained by the Custodial Trust are being used to identify and locate as many underground utilities as

possible. Although additional data are needed to support detailed engineering, the need for data collection will be evaluated as part of the engineering design.

- Structures—Partially completed. Asarco engineering drawings available onsite are being reviewed during detailed engineering to determine if data are sufficient. No additional data collection recommended until drawing review is completed.
- Borrow sources and geotechnical data—Completed. Data are summarized in the draft Phase II RFI Report. Additional test pits were excavated along the East Bench in January 2012 to determine soil types and aggregate sizes to estimate quantities of construction materials. The results of the testing showed that materials could be categorized as topsoil, subsoil, gravelly/cobbly alluvium, or Tertiary sediments. Initial volume estimates for topsoil and subsoil are 18,000 and 34,000 yd^3 respectively.
- ERM Survey—Completed. An ERM Survey was performed during the summer of 2012. The Phase 1 demolition area was surveyed between July 18 and 20, and the remainder between August 14 and 19. The Phase 2 work summary is underway. The Phase 1 survey is summarized as follows:
  - **Asbestos-containing material (ACM)** was not identified in the Phase 1 demolition area survey. Any ACM identified in the Phase II survey or if it is encountered during demolition or excavation activities, will be managed as ERM.
  - **Fluorescent light tubes** were identified throughout the former Smelter site buildings within sheet metal light fixtures. The USEPA has determined that even environmentally friendly Fluorescent Light Elements still contain low amounts of mercury, and must be managed and disposed as universal waste. These elements must be collected for reuse, recycling, or properly disposed of as a universal waste prior to demolition of the structure.
  - **Sodium vapor and metal halide lightbulbs** were identified with in select Phase 1 structures. These lightbulbs are all assumed to contain mercury vapor. Metal halide lightbulbs contain heavy metal gases. These elements must be collected for reuse, recycling, or properly disposed of as a universal waste prior to demolition of the structure.
  - A **mercury thermometer** was identified inside the upper office on the north end of the CSHB. This thermometer must be recycled, reused, or properly disposed of as universal waste prior to the demolition of the structure.
  - **Mercury switches** were not identified with any electrical light switches, controller boxes or limit switches present within the facility structures.
  - **Polychlorinated biphenyl (PCB) ballasts and small capacitors** were not identified in light units as either start-up ballasts or small electrical capacitors present within the facility based on visual inspection of approximately 10 percent of the identified light fixtures. The visually inspected ballasts or capacitors are printed with ‘NO-PCBs’ on equipment labeling.
  - **Electrical transformers** were identified throughout the former Smelter site buildings and on exterior utility poles. One tag was found which stated that the transformer did not contain PCB oil. In the absence of other tags or dates of manufacture, the transformers are assumed to be PCB-contaminated electrical equipment (in other words, transformers that contain oil with greater than or equal to 50 ppm and less than 500 ppm PCBs) and regulated for disposal under TSCA unless tested to verify the PCB content.
  - A large amount of **biological waste material** primarily in the form of avian (bird) feces was observed throughout the structures within the Phase 1 area.
  - **Miscellaneous hazardous materials** were also observed during the visual inspection of the Phase 1 structures:
    - Four (4) air-conditioning units containing ozone-depleting substances were observed and it could not be verified if freon, an ozone-depleting substance, had been removed from these units. These units

should be inspected and properly drained by a licensed heating, ventilating, and air-conditioning contractor before demolition of the structures.

- Small amounts of miscellaneous chemicals were observed in the top office in the north end of the CSHB. These materials will be removed before demolition, solidified, and disposed of in CAMU 3. Otherwise, these chemicals will be removed, characterized, and properly disposed of as waste before demolition.
- Pressure-treated timbers, railroad ties, and lumber were observed in association with the drainage sumps and truck scale. These may contain polycyclic aromatic hydrocarbons (creosote), chromated copper arsenate, and semivolatile organic compounds. These materials should be removed and properly disposed of before the demolition of the structure. The materials will be managed as general construction waste.

4.2 Additional Data Requirements for 2013 Work

Additional data requirements for engineering and construction of the work identified in this IM Work Plan 2013 are limited at present. The following potential data needs have been identified and are currently being evaluated:

- **Soil Chemistry Data Collection**—The need for and extent of additional soil chemistry data at the East Bench is currently being evaluated. If collected, these data would provide additional information on soil conditions, potential human health and ecological risk evaluations, and proper handling and reuse of soils to be excavated during the PPC Temporary Bypass. If deemed necessary, the additional data could be collected through future sampling events with appropriate data quality objectives and as part of construction activities for the proposed new alignment of the City of East Helena Water line. SLVs to be used for initial evaluations of potential human health and ecological risk will be those referenced in Section 3 of this IM Work Plan 2013.
- **IM Performance Evaluation**—Additional data will be developed to monitor and evaluate the performance of the IMs. Data from the Groundwater Flow, Fate, and Transport model currently under development will be used for IM performance evaluations, and specific IM performance monitoring plans will be developed.

SECTION 5

Engineering Design and Construction Information for Proposed 2013 Projects

This section summarizes engineering design and construction activities associated with the Phase 2 demolition and the PPC Temporary Bypass proposed for implementation in 2013. A schedule for task implementation is provided in Section 8. Once source removal evaluations have determined if there is the need for additional CAMU capacity, design and construction information for CAMU 3 will be finalized and submitted to USEPA, and for public review and comment, as part of the separate technical report required to support the agency's formal designation of the unit.

5.1 Phase 2 Demolition

Phase 2 demolition will remove most of the remaining buildings, structures, and utilities in the south and east plant area. Structures and buildings required to maintain stormwater collection and treatment (HDS, tanks, and sumps) will remain in operation until sufficient work is completed on the ET Cover System to obviate the need for the functions they currently provide.

5.1.1 Key Design Objectives

The primary objectives for all phases of demolition at the former Smelter site are as follows:

- Perform all work in a manner that is protective of human health and the environment, efficient, and cost-effective.
- Salvage or recycle materials from the demolition activities to the extent possible, and dispose of or recycle debris appropriately.
- Manage stormwater runoff through collection, treatment, and discharge.
- Consider the impacts of weather on the project when scheduling the work and plan to mitigate impacts.
- Avoid disturbance of migratory bird nesting areas during nesting season.
- Minimize the potential for impacts to local businesses and the community of East Helena.

The demolition sequencing plan has been designed to maximize the safety, efficiency, and cost-effective management of the project. The sequencing has been established to fulfill the following objectives:

- Allow for the effective use of the existing facilities to support the demolition activities.
- Protect the existing stormwater system until construction of the ET Cover.
- Provide emergency storage capacity for stormwater.
- Provide protection from groundwater infiltration during the demolition activities by limiting the amount of time bare soil is exposed at the ground surface.
- Maximize salvage and recycling to reduce the volume of materials to be disposed of in the CAMUs.
- Perform the demolition in a manner that allows for effective and efficient material segregation for recycling or disposal.
- Take reasonable steps to protect the existing temporary geomembrane covers over the previous demolition areas.
- Consider the other IM activities that will be conducted and coordinate the demolition packages accordingly.

- Consider efficiency in implementing the demolition work that results in the lowest reasonable cost.
- Allow efficient coordination with other projects (for example, potential excavation associated with source removal actions and ET Cover construction).

5.1.2 Design and Construction Features

Phase 2 demolition will remove more than 60 buildings and structures, beginning in the areas of highest elevation and progressing toward the lower-elevation areas, as shown in Figure 5-1. Structures that manage stormwater will be demolished during Phase 4 demolition (the HDS water treatment plant [Structure 75] and MCC Building [Structure 74]). Temporary utility service will be established as needed.

The following structures will be demolished during Phase 2 (note that the structures are referred to by their historical designations):

- Electric Shop - #40
- Warehouse - #41
- Pump House - #42
- Blast FCE Heat Exchanger - #43
- Machine Shop - #44
- Blacksmith Shop - #45
- Shop Storage - #46
- Shop Lunchroom - #47
- D.O.E.S Bldg - #48
- Oxygen Farm - #49
- Truck Scale - #51
- Pump House - #52
- Meter House - #53
- Acid Plant Drain Water Sump Pump - #54
- Truck Fill Station - #55
- Acid PL Pump - #56
- Trailer - #65
- Hydrogen Peroxide Tanks - #67
- Direct Smelt Bldg - #72
- Neutralization Bldg - #73
- Sludge Recovery Bldg - #76
- Lime Silo - #77
- HERO Bldg - #78
- Soda Ash Silo - #80
- Slag Handling Facility - #33
- Powerhouse Heat Exchange - #34
- MPC Transformers – NEW Substation - #35
- Oil & Grease House - #36
- Oxy-Acetylene Storage - #37
- Diesel Tank - #38
- Power House - #39
- Zinc Plant O2 Bldg - #25
- Abandoned Liquid Sodium Handling Bldg - #26
- Gas tank - #27
- B.F. Lunch Room - #28
- Locomotive Crane Shed - #29
- B.F. Office - #30
- Acid Dust Facility - #31
- MT. Pwr N.G. Meter Bldg - #1
- Warehouse Annex - #4
- Storage - #8
- L.M.P.T - #9
- Dispensary - #10
- PMP HS - #13
- DIL HS - #14
- Paint Storage Bldg - #15
- Refractory Storage - #17
- High Lead Shop - #18
- Meeting Room - #19
- Paint Shop - #20
- Motor Storage - #21
- Masons Shop - #22
- Coal Mill Foundation - #23
- High Lead Welding Shop - #24
- Sanitary Treatment - #16
- Change House - #11
- Equipment Washing Bldg - #79
- Acid Tank Piping - #68, 69, and 70
- Zinc Shed - #86
- Explosive Bunker - #87
- Pump Shed - #88
- Zinc Plant Foundations (no structures) - #89

Several measures will be implemented to protect human health and the environment during the Phase 2 demolition work, as listed in Section 5.1.4.2. During demolition, and in the interim period between demolition and the completion of the ET Cover System, stormwater management will be of primary concern, as briefly described in Section 5.1.3.3. Foundations and ground covering (asphalt and concrete) will remain in place until just before construction of the three phases of ET Cover to protect groundwater from infiltration and to reduce the cost to construct and maintain temporary covers in these areas. These foundations and ground coverings will be broken up in place to prepare for construction of each section of the ET Cover. Temporary covers will be placed at locations where existing foundations and ground coverings are removed and will be maintained until the ET Cover construction is initiated.

Demolition debris and onsite materials will be recycled or reused to the extent possible. Concrete debris will be left on site in the below-grade areas of demolished buildings. Through the process of removing the reinforcing steel for recycling, the concrete debris will be reduced in size sufficiently to prevent voids in the resulting debris piles that could promote differential settlement in future engineered cover material over the area. The concrete debris will be machine-compacted to further preclude voids. In areas of the ET Cover, fumed slag will be used on top of the concrete and below the ET Cover. Fumed slag from the site will also be used as backfill in low-lying areas.

5.1.3 Design and Construction Activities

5.1.3.1 Environmentally Regulated Material (ERM) Abatement

ERM abatement will be conducted before demolition begins and will include the removal, management, and disposal of existing nonhazardous, hazardous, and regulated building materials. ERM identified through building surveys conducted in 2012 includes mercury in switches and gauges, lead-based paint, lightbulbs (fluorescent, mercury vapor, and sodium), and ACM. These materials will be handled, transported, and disposed in accordance with regulatory requirements. Additional information regarding management of these wastes is provided in Section 6 of this IM Work Plan.

Available information indicates that some asbestos abatement activities have been performed in these buildings. Prior to the start of construction, the contractor will confirm completion of abatement activities. If site inspections identify any remaining ACM, this material will be removed in accordance with applicable statutory requirements prior to the start of demolition activities.

Trash, carpet, insulation, glass, wall partitions, and other materials will be removed from the interior and exterior of the structures after abatement. These “soft” demolition activities will be carried out by skid steers and small tracked vehicles. The structures will generally be demolished using a “top-down” approach. The structures generally consist of steel and concrete framing on concrete and concrete at-grade foundations. Steps will be taken to reduce the amount of below-grade demolition and soil disturbance. Mechanical demolition equipment such as hydraulic excavators equipped with special attachments (e.g., breakers and shears) will be used to improve worker safety, facilitate sorting and recycling, and reduce the release of dust.

5.1.3.2 Demolition

The structures to be demolished under Phase II demolition consist primarily of concrete and steel framed buildings. All waste generated during the demolition will be transported to a CAMU, an appropriate offsite landfill, an offsite recycling facility, or maintained for use onsite. Demolition plans will strive to salvage or recycle as much waste material as possible.

Sequencing mechanical demolition techniques should help ensure safe working conditions during the building demolition. Various excavators equipped with special attachments will be used to demolish the building in a controlled manner. By using grapples, pulverizers, breakers, processors and shears, building structures can be cut and broken down with minimal dusting. This mechanical approach will allow for the structures to be demolished, sorted, sized, stockpiled, and readied for transportation, thus reducing the work force, minimizing dust and waste, and preventing potential exposure to workers and the community.

The above-grade concrete walls, slabs, foundations, and footings will be demolished using a track-mounted excavator equipped with hydraulic breakers and pulverizers. Horizontal surfaces will be fractured to reduce subsurface disturbance. Footings and foundations will be exposed by an excavator that will excavate around each below grade structure to gain access. The concrete will be used as backfill onsite.

Interior and Exterior Soft Demolition. Once the subject building has been cleared of all asbestos and universal waste, the soft demolition activities will commence. Activities will consist of skid-steer or track-loaders removing wall partitions, trash, carpeting, insulation, glass, and any other miscellaneous debris. Trash will be staged in piles, loaded, and hauled to a recycling facility, CAMU 2, or an appropriately permitted landfill for disposal as either municipal solid waste or construction and demolition waste. Soft debris may also be removed and segregated during structure demolition.

Wall, Column, and Roof Demolition. Typical demolition will be completed with the use of several track-mounted excavators and loader equipment with various attachments to assist in the pulling in of walls and laying down support columns and roof structures.

The excavators will first create an access way by demolishing a section of the wall panel. Once access has been created, the demolition crew will expand the demolition envelope by working their way into the structure and shearing strategic points of the support column and roof structure, thus encouraging the laying down of the section in a methodical manner. Roof structure components will be sheared into manageable pieces and then consolidated with use of grapple attachments and smaller shearers to further reduce components for eventual offsite disposal or recycling. This technique will also be employed for the elevated structures such that the structure is “laid” over gently using specific cuts in the structural elements to counteract the tendency to fall over without resistance.

During the demolition of the roof structure, the demolition crew will begin to demolish the perimeter wall. This demolition will also be accomplished with the use of a track-mounted excavator fitted with breaker, grapple, and concrete pulverizing or other equipment. The demolition crew will place previously consolidated rubble in the laydown path to give the area an uneven surface, which will further fracture the concrete panel to improve consolidation of materials. This technique will also reduce dust generation by preventing free-fall of the panels to a level surface. Once at grade, the excavator will segregate materials and track-loaders will consolidate like materials for eventual loading and offsite disposal or recycling.

Demolition teams will leave as much of the outer perimeter wall as possible during the roof structure demolition activities to create a concrete “envelope” to help reduce dust and noise. If at any time the wall panels show signs of diminished integrity, the subject panel will be brought down as described above.

Asphalt paving removal will be limited to areas where needed to support foundation removal efforts. Before removal, utility locations will be marked. Slab will be broken in place by a concrete stomper or excavator with a breaker attachment to fracture the slab and paving. Reasonable efforts will be made to minimize below-grade soil disturbance. The broken concrete building slabs, walls, and foundations have been designated for use as onsite backfill.

Demolition of Below-grade Structures. Below-grade structures will be left in place. Building slabs will be fractured or perforated to minimize the potential for future differential settlement or the creation of hard spots beneath the final cap.

Utilities will be removed concurrent with foundation demolition. As the above-grade demolition is taking place, personnel will mark and delineate utility locations to facilitate abandonment or removal (if required). Overburden soil on top of the subject utility will be excavated and placed adjacent to the excavation. The utility will be removed in pieces and staged next to the excavation for eventual handling. The utility will be followed until their end or until property lines are reached.

Sizing Activities. Concrete debris will be reduced in size to prevent voids in the resulting debris piles that could promote differential settlement in the ET Cover System. Rebar protruding from concrete will be sheared. The reinforcing steel or “rebar” from the concrete media will be placed into a roll-off bin.

Through the course of the project, site personnel and equipment will salvage all potential ferrous and nonferrous metals to maximize recycling value. As structures are being demolished, all salvageable components will be consolidated and scheduled for offsite recycling.

5.1.3.3 Stormwater Management

Control of stormwater runoff will be a priority throughout the demolition activities. During Phases 1, 2, and 3, the stormwater collection and treatment system will continue to operate with only minor rework. In Phase 4, the treatment system will be taken out of service during the final stages of demolition activities. To direct and control runoff as areas are demolished, fumed slag or other fill will be placed at predetermined interim grades in the demolition areas prior to installation of the ET Cover. The grading plan will be designed to coordinate with the ET Cover, and channel clean runoff in a controlled manner to proposed drainage discharge areas.

Facility demolition will be sequenced with ET Cover System construction to minimize stormwater infiltration into disturbed areas of the site that were formerly capped by buildings and other structures. The ET Cover construction is currently anticipated to occur in three phases, and each phase will result in reduced stormwater flow to the HDS. The proposed 2013 demolition work includes the areas associated with Phases 2 and 3 of the ET Cover System IM, which combined make up approximately 50 percent of the collection area. When finished, the ET Cover System will cap all former process areas at the Site and enable nonimpacted precipitation runoff to be shed to offsite drainages.

Where the building structures are removed, remaining foundations and intact, below-grade slab foundations will be broken up to prevent potential subsurface ponding areas. Any pavement left intact will then be fractured (but not removed) as part of subsequent interim or remedial measure construction.

The existing temporary geomembrane cover system will be maintained and protected during the phased activities. New temporary geomembrane covers may be necessary to cover the newly demolished areas for prevention of stormwater infiltration into contaminated soils, if those areas were previously covered by pavement or foundations that have been removed. The existing and new geomembrane covers are anticipated to be in service for a short period (1 to 3 years) before the final ET Cover is constructed.

5.1.3.4 Protection of Migratory Birds During Demolition

As required by the MBTA, demolition activities will be planned to prevent disturbances during nesting season. The Custodial Trust is currently obtaining additional information on the types and nesting locations of migratory birds at the former Smelter site.

5.1.4 Preliminary List of Demolition Specifications

The following is a preliminary list of demolition specifications that will need to be addressed before the start of demolition activities:

- General Information
- Site-Specific Health and Safety Plan
- Hazardous Materials Abatement Plan
- Recyclable Materials Plan
- Dust Control Plan
- National Emission Standards for Hazardous Air Pollutants Permit
- Construction Schedule
- Stormwater containment, run-off patterns, and water management
- Site Security
- Administrative, staging, and decontamination facilities
- General construction permitting
- Preconstruction meeting
- Mobilization

5.1.4.1 General Requirements

Demolition activities will follow all applicable federal, state, and local laws and regulations as well as the requirements of the IMWP. Additional precautions not identified in this section may be required.

5.1.4.2 Site-Specific Health and Safety Plan

The applicable, site-specific health and safety requirements for contractors and their personnel working on the site specify compliance with the sitewide *Master Health and Safety Plan, East Helena Facility* (Custodial Trust, 2012), and are as follows:

- Site-specific health and safety plan
- ACM regulations and site-specific requirements
- Universal Waste Management Plan
- Recycling requirements
- Dust Control Best Management Plans
- Stormwater Pollution Prevention Plan (SWPPP)
- Site Security
- Administration, Staging, and Decontamination Facilities
- General Construction Permitting

5.2 Prickly Pear Creek Temporary Bypass

As noted in Section 2, the PPC Temporary Bypass will temporarily divert water away from the southeastern portion of the former Smelter site, facilitating implementation of the SPHC and potential Source Removal IMs. The proposed PPC Temporary Bypass alignment is shown in Figure 2-3.

5.2.1 Key Design Objectives

Key design objectives for the PPC Temporary Bypass are as follows:

- Provide the capacity to convey design flood events without increasing the likelihood of flooding down stream
- Allow future demolition of Smelter Dam, breaching of the Upper Lake diversion structure, and the realignment of PPC.
- Stage and manage excavated earthen materials for use in the construction of the ET Cover system, if needed. Stockpiles will be carefully managed to protect human health and the environment.

5.2.2 Design and Construction Features

The following key elements are being incorporated into the Temporary Bypass design:

- The Temporary Bypass flow channel will be a two-tiered trapezoidal channel:
  - The low-flow channel will be designed to convey the 5-year recurrence interval flow.
  - The low-flow and high-flow channels, taken together, will be designed to convey the 25-year recurrence interval flow. This will reduce potential flooding impacts to Smelter Dam, thereby reducing the potential that the dam will fail.
- A spillway will redirect flow in excess of the 25-year event back into the existing PPC flow channel.
- Temporary steel bridges will be installed over the Temporary Bypass channel and Smelter Dam to provide a haul road from the East Bench to the plant site. This haul road will support future construction of the ET Cover System.
- The geometry of the temporary channel will be configured to provide slope stability.
- The bypass channel will be located in the East Bench. A minimum distance of 10 feet will be maintained from the existing riparian vegetation along the current PPC.

- The channel will be sufficiently wide to generate a portion of the required materials' volumes to construct portion of the ET Cover System.
- Excavated material will be stockpiled in the AOC between the Temporary Bypass channel and Highway 512, where it will be processed into suitable gradations for future use. The stockpile area locations are proposed for south of Smelter Dam Road to avoid the CERCLA-contaminated soils placed north of the road.
- Upper Lake diversion structure will be removed and Upper Lake diversion ditch will be backfilled.

The Temporary Bypass channel will be constructed after the utilities (NorthWestern Energy overhead electrical lines and East Helena Water Supply pipeline) have been relocated in the East Bench (which has been scheduled for completion in 2013). The Air Liquide facilities were removed in October 2012. Construction will begin upstream of existing Upper Lake diversion structure, turn east into the adjacent East Bench, and then move northward to a termination point just downstream of Smelter Dam. The bypass channel will remain in place until the PPC realignment project is completed and surface water flow is transferred into the newly realigned channel. When the realigned PPC is functioning, the temporary bypass excavation will be blended into the eastern floodway/floodplain of the realignment. The plan and profile for the PPC Temporary Bypass is provided in Figures 5-2 through 5-4.

PPC Temporary Bypass construction is sequenced as the first SPHC project to divert PPC around Smelter Dam, the Upper Lake diversion structure, and the PPC realignment area. Following diversion of PPC flow into the bypass, the Upper Lake diversion structure will be removed and the Upper Lake dam breached to facilitate dewatering of the South Plant area. This step will also help to dewater Lower Lake and Tito Park to facilitate possible future removal actions. Construction of the bypass is scheduled to be completed in the fall of 2013. Actual diversion of PPC flow into the bypass is expected to occur in mid to late fall of 2013. It is anticipated that the bypass will be operational for approximately 2 calendar years, including two spring high-flow events.

Conceptual engineering design components associated with the PPC Temporary Bypass are summarized as follows:

- Geomorphic Analysis—Channel plan form, grade, and hydraulics
- Hydrogeologic Analysis—Groundwater flow and potentiometric surface pre- and post-construction (this work will be coordinated with ongoing groundwater flow and contaminant transport modeling being completed by the Custodial Trust)
- Hydrologic Analysis—Review of relevant stream gauge records, development of flow-duration curves for channel stability analysis, and low-flow conditions (typical and extreme) to aid in channel design and fish passage analysis
- Hydraulic Modeling—Update of the hydraulic model developed for the PPC Temporary Bypass to estimate realigned channel hydraulic capacity and stability
- Channel Stability Analysis of Existing Condition—Incipient motion analysis to determine the range of flows needed for bed mobilization and sediment continuity analysis to evaluate aggradation and degradation trends in PPC
- Design Criteria—Summary of appropriate design events (flood magnitudes), vertical and horizontal alignment, bank construction, potential wetlands areas and floodplain design, infrastructure protection, habitat, diversity, fish passage, and other items identified in consultation with various agencies and stakeholders
- Conceptual Engineering Report—Technical memorandum with discussion of topics such as geomorphology, instream sediment chemistry, hydrology, hydraulics, channel stability, design criteria, and the conceptual design

5.2.3 Construction and Quality Management

Implementation challenges associated with constructing the PPC Temporary Bypass include large quantities of silt, sand, gravel, and cobbles that will need to be excavated from the East Bench and electrical, gas, and water present along the alignment that need to be relocated. The start of Temporary Bypass construction will be coordinated with the utility relocation activities. Excavation is expected to begin in the central portion of the project area and proceed north and south to the points where the bypass ties into PPC. The actual tie-in from the bypass channel to PPC will not be completed until the required permits are obtained.

5.2.3.1 Materials Management

Construction of the Temporary Bypass is expected to involve the excavation, processing, and stockpiling of approximately 231,000 yd^3 of material. The majority of this material is planned for reuse in other IMs to be completed at the site, including the ET Cover System IM. Material stockpiles will be located within the AOC on the East Bench near the construction area.

5.2.3.2 Protective Measures

Construction will take place in accordance with applicable permits, laws, and regulations. This will include obtaining required construction permits (for example, dust control and stormwater). Traffic routes, laydown and parking areas, and other temporary facilities and controls will be specified to reduce impact to nearby residences and the environment. In addition, temporary erosion and sedimentation control plans (including the SWPPP) will be implemented for work and stockpile materials processing areas. The contractor will also be required to comply with the Smelter Dam Emergency Action Plan currently being developed by the Trust.

5.2.3.3 Preliminary List of Specifications

A preliminary list of specifications that will be included in the PPC Temporary Bypass bid package has been prepared (Appendix C). A similar list will be prepared for the PPC realignment during conceptual design.

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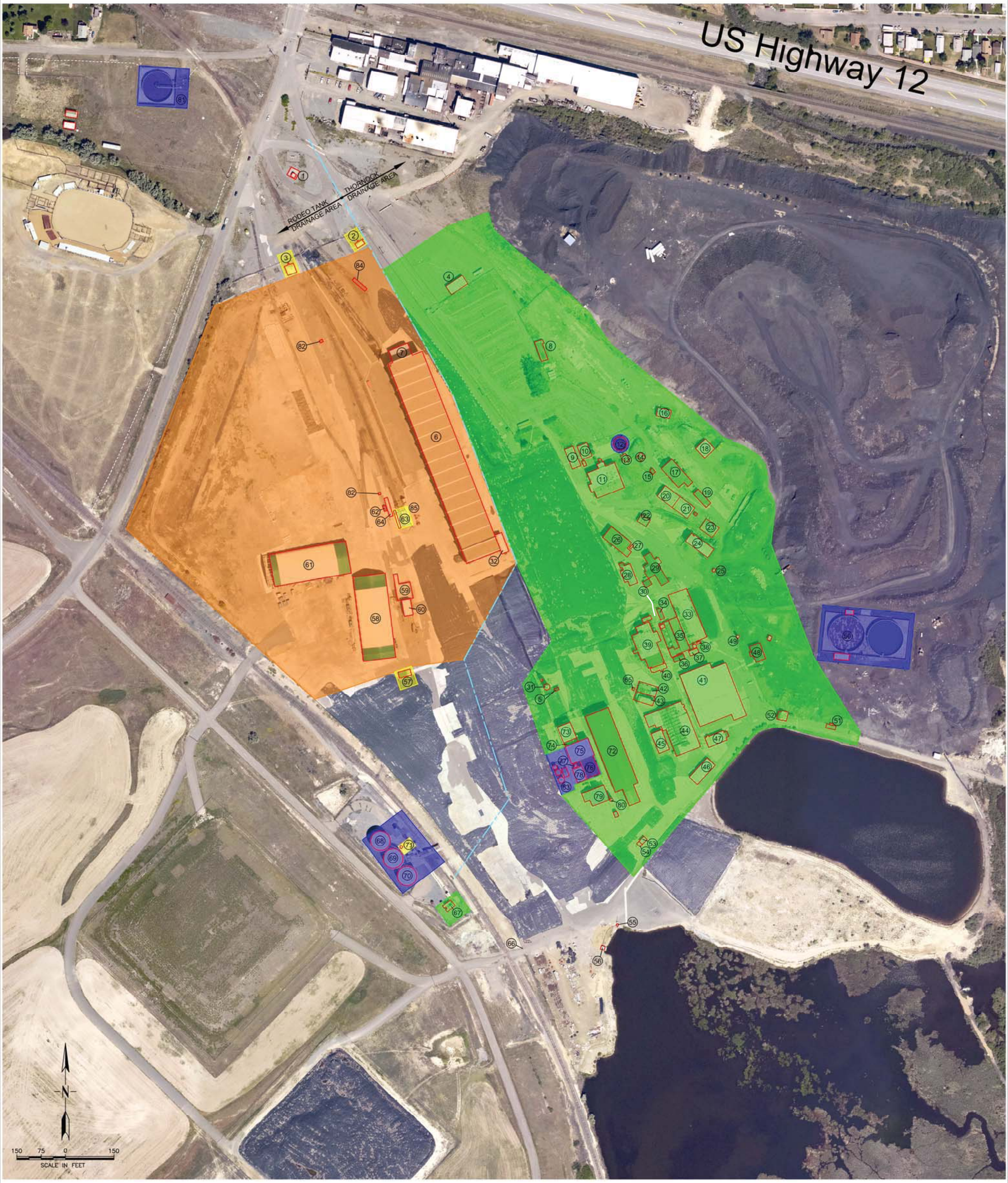

SOURCE OF AERIAL PHOTO: DJ & A ; 9/22/11

LEGEND

PHASE 1
PHASE 2
PHASE 3
PHASE 4

NO.	STRUCTURE NAME	NO.	STRUCTURE NAME	NO.	STRUCTURE NAME	NO.	STRUCTURE NAME	NO.	STRUCTURE NAME
1	MONTANA POWER N.G. METER BLDG.	19	MEETING ROOM.	37	OXY-ACETYLENE STORAGE	55	TRUCK FILL STATION	73	NEUTRALIZATION BUILDING
2	SUMP	20	PAINT SHOP	38	DIESEL TANK	56	ACID PL PUMP	74	MCC BUILDING
3	SUMP	21	MOTOR STORAGE	39	POWER HOUSE	57	SUMP	75	HDS WATER TREATMENT BUILDING
4	WAREHOUSE ANNEX	22	MASONS SHOP	40	ELECTRIC SHOP	58	100 FT. X 260 FT. BARNUM COVERALL BUILDING	76	SLUDGE RECOVERY BUILDING
~~5~~	~~THAWHOUSE~~	23	COAL MILL FOUNDATION	41	WAREHOUSE	59	UNLOADING DOCK	77	LIME SILO
6	CONCENTRATE /ORE STORAGE & HANDLING BLDG	24	HIGH LEAD WELDING SHOP	42	PUMP HOUSE	60	HIGH GRADE BUILDING	78	HERO BUILDING
7	CRUSHING AND STAMPING	25	ZINC PLANT O2 BUILDING	43	BLAST FCE. HEAT EXCHANGER	61	100 FT. X 260 FT. BAILEY COVERALL BUILDING	79	EQUIPMENT WASHING BUILDING
8	STORAGE	26	ABANDONED LIQUID SODIUM HANDLING BLDG.	44	MACHINE SHOP	62	SCALE HOUSE	80	SODA ASH SILO
9	L.M.P.T.	27	GAS TANK	45	BLACKSMITH SHOP	63	SUMP	81	RODEO STORM WATER TANK
10	DISPENSARY	28	B.F. LUNCHROOM	46	SHOP STORAGE	64	TRUCK SCALE	82	STORMWATER VAULT (2)
11	CHANGEHOUSE	29	LOCOMOTIVE CRANE SHED	47	SHOP LUNCHROOM	65	TRAILER	83	HDS STORAGE TANKS
12	90,000 GAL. THORNOCK TANK	30	B.F. OFFICE	48	D.O.E.S. BUILDING	66	CONTRACTORS GATE	84	RAILROAD FLAT CAR
13	PMP HS	31	ACID DUST FACILITY	49	OXYGEN FARM	67	HYDROGEN PEROXIDE TANKS	85	RAIL CRANE, FUEL TANKS, BUCKETS
14	DIL HS	32	M.C.C. BUILDING	50	TANK FARM	68	50' DIA. ACID TANK		
15	PAINT STORAGE BUILDING	33	SLAG HANDLING FACILITY	51	TRUCK SCALE	69	60' DIA. ACID TANK		
16	SANITARY TREATMENT	34	POWERHOUSE HEAT EXCHANGE	52	PUMP HOUSE	70	50' DIA. ACID TANK		
17	REFRACTORY STORAGE	35	MPC TRANSFORMERS - NWE SUBSTATION	53	METER HOUSE	71	SUMP		
18	HIGH LEAD SHOP	36	OIL AND GREASE HOUSE	54	ACID PLANT DRAIN WATER SUMP PUMP	72	DIRECT SMELT BUILDING		

MORRISON MAIERLE, INC.
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1 Engineering Place
Helena MT 59602
Phone: (406) 442-3050
Fax: (406) 442-7862

DRAWN BY: JAC
CHK'D. BY: LJB
APPR. BY: AKE
DATE: 8/2012

EAST HELENA SMELTER
EAST HELENA, MONTANA

FIGURE 5-1
Phase 2 Demolition
Interim Measures Work Plan–2013
East Helena, Montana

PROJECT NO.
2557.007

EXHIBIT

R:\2557\007\ACAD\Exhibits\DEMO SEQUENCING PLAN\EXHIBIT 8.dwg Plotted by jerry chambers on Aug/21/2012

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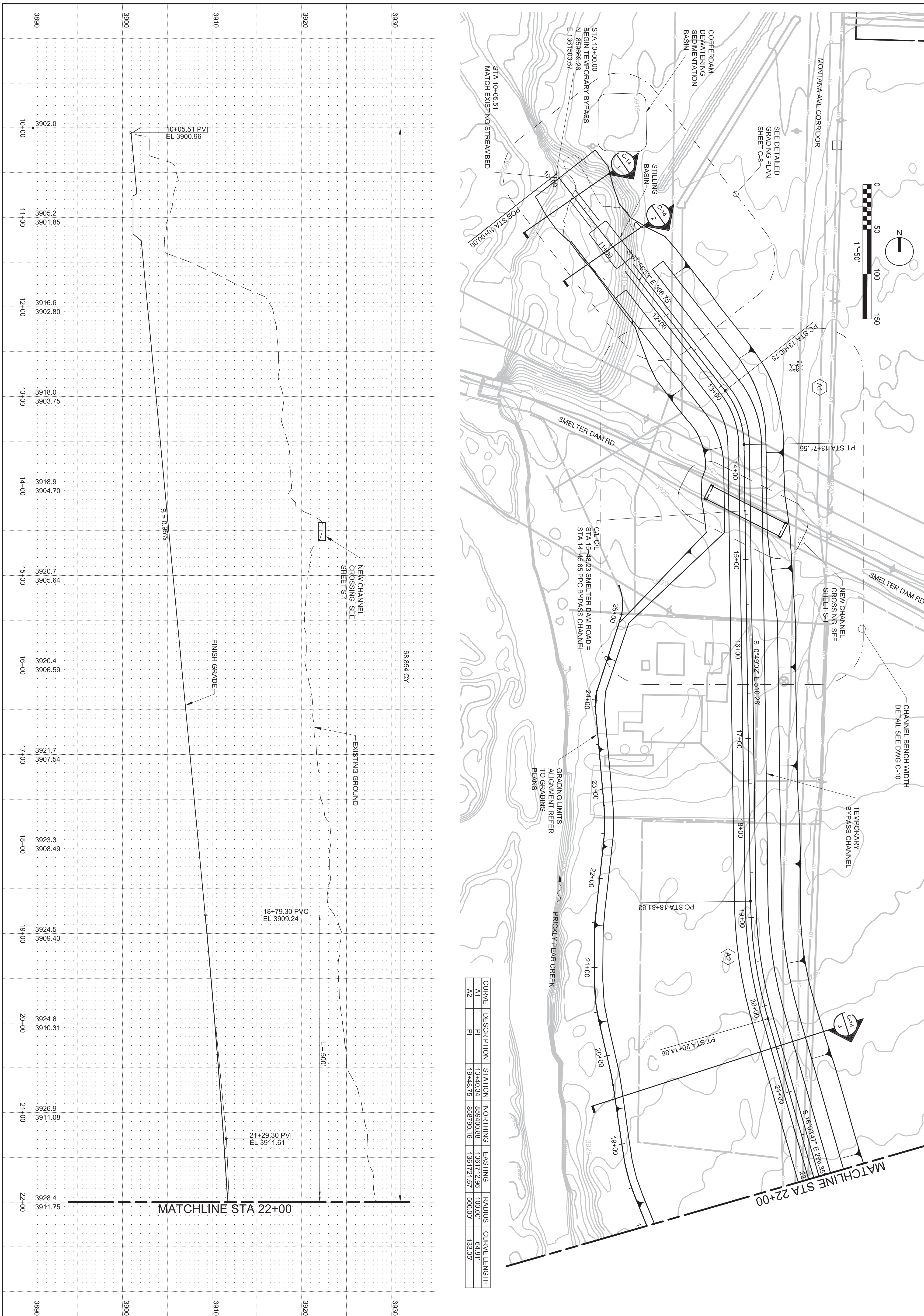

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A2	PI	19+48.75	858790.16	1361721.67	500.00'	133.05'

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PLOT TIME: 9:46 AM

CH2MHILL

VERIFY SCALE
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1"=50'

FIGURE 5-2
Plan and Profile for Prickly Pear Creek Temporary Bypass—1 of 3
Interim Measures Work Plan–2013
East Helena, Montana

METG Montana Environmental Trust Group

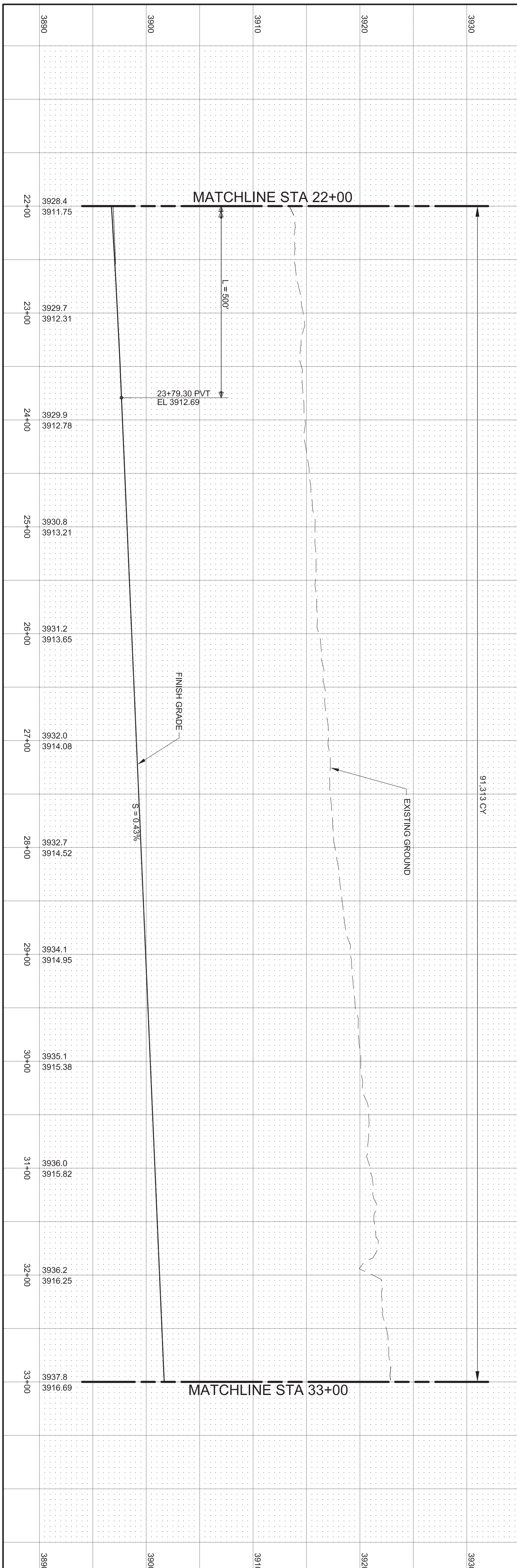
Former ASARCO Smelter Site
East Helena, Montana
Montana Environmental Trust Group
East Helena, Montana

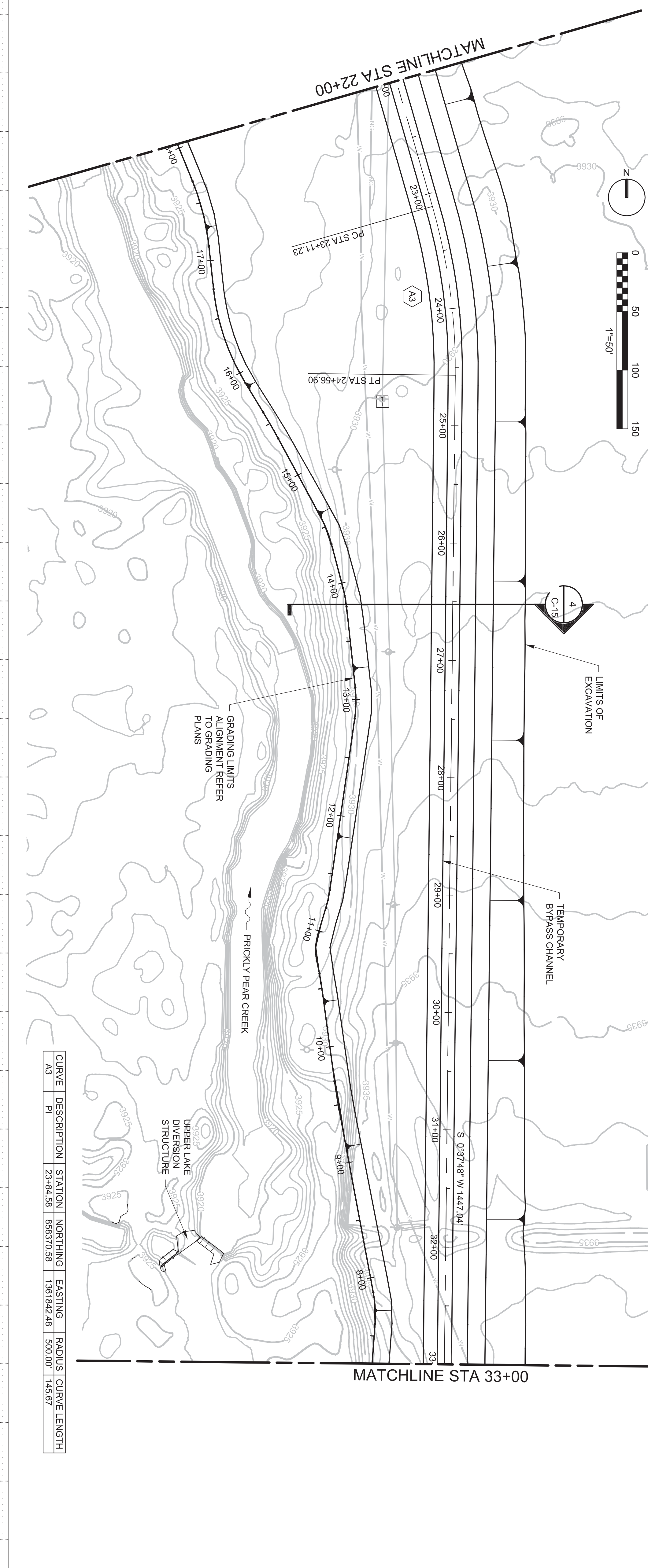
NO.	DATE	REVISION	BY	APVD

DSGN PJ KRYCH | DR CR COSBY | CHK JG DEHNER | APVD SW DETHLOFF

DATE AUGUST 2012
PROJ 420947
DWG C-2
SHEET 6 of 26

PERMIT SET - NOT FOR CONSTRUCTION





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FILENAME: 14C021d.dwg

PLOT DATE: 29-Aug-12

SHEET	7 of 26
DWG	C-3
PROJ	420947
DATE	AUGUST 2012

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"
1" = 50'

CH2MHILL.

METG
Montana Environmental Trust Group

FIGURE 5-3
Plan and Profile for Prickly Pear Creek
Temporary Bypass—2 of 3
Interim Measures Work Plan–2013 East Helena, Montana

Former ASARCO Smelter Site
East Helena, Montana
Montana Environmental Trust Group
East Helena, Montana

NO.	DATE	REVISION	BY	APVD

DSGN P.J KRYCH | DR CR COSBY | CHK JG DEHNER | APVD SW DETHLOFF

PROFESSIONAL ENGINEER MONTANA DOUGLAS BUSKO No. 15501 LICENSED

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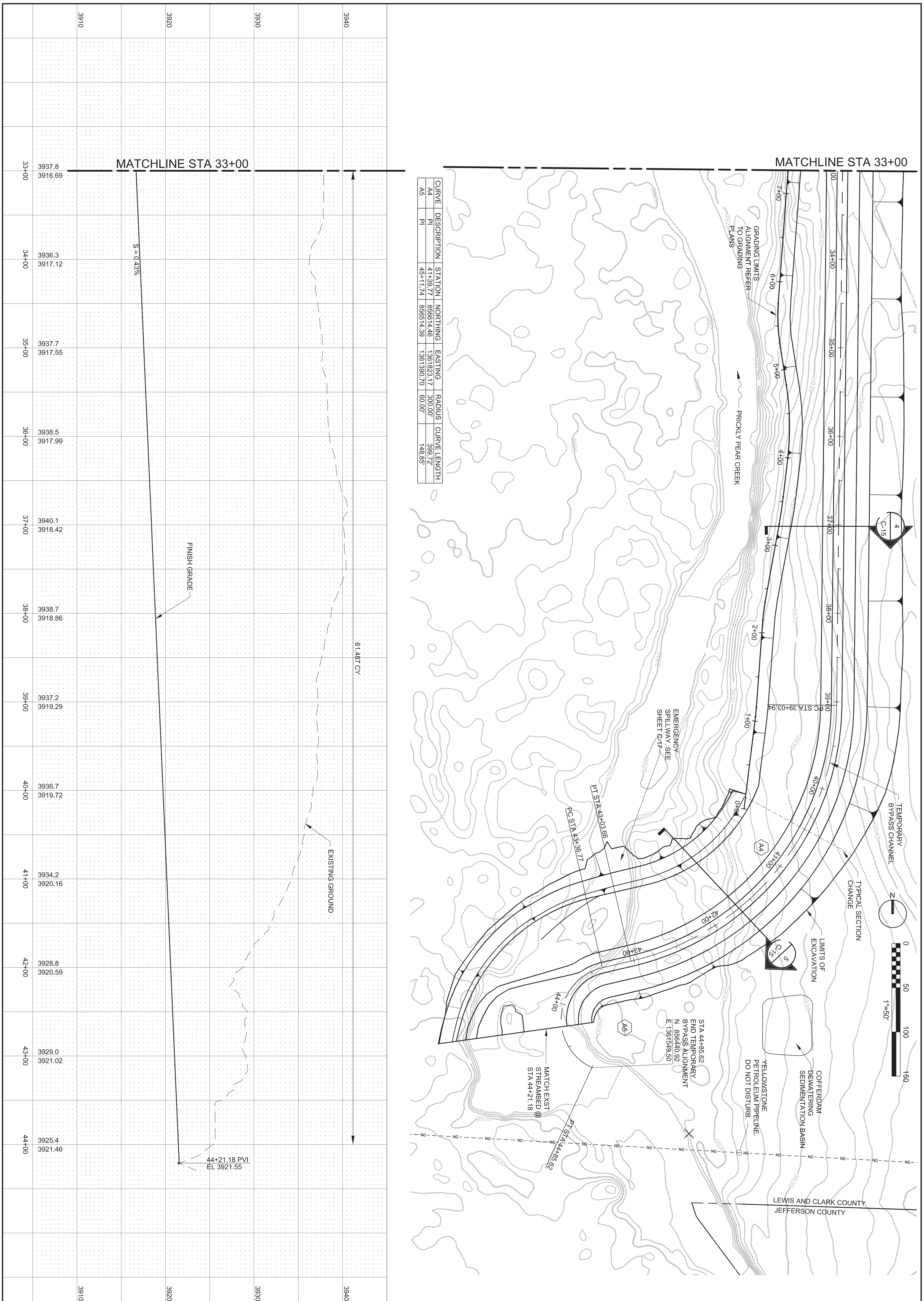

CURVE	DESCRIPTION	STATION	NORTHING	EASTING	RADIUS	CURVE LENGTH
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PLOT TIME: 10:00 AM

SHEET 8 of 26 | DWG C-4 | PROJ 420947 | DATE AUGUST 2012

BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

VERIFY SCALE 1"=50'

CH2MHILL

FIGURE 5-4
Plan and Profile for Prickly Pear Creek Temporary Bypass—3 of 3
Interim Measures Work Plan–2013 East Helena, Montana

METG Montana Environmental Trust Group

Former ASARCO Smelter Site
East Helena, Montana
Montana Environmental Trust Group
East Helena, Montana

NO.	DATE	REVISION	BY	APVD

DSGN PJ KRYCH | DR CR COSBY | CHK JG DEHNER | APVD SW DETHLOFF

PERMIT SET - NOT FOR CONSTRUCTION

SECTION 6

Remediation Waste Management

This section describes the proposed approach for managing remediation waste associated with implementation of the proposed 2013 IM elements.

6.1 Use of the Area of Contamination and CAMUs

The description and rationale for the AOC at the East Helena Facility was approved by USEPA in their conditional approval of the IM Work Plan 2012, dated August 28, 2012. As shown in Figure 6-1, the AOC covers Parcels 16 and 19 (the former Smelter site operating area); the area of Parcel 15 containing CAMUs 1 and 2, portions of Tito Park, Lower Lake, and Upper Lake; the portion of Parcel 8 west of State Highway 18, and Parcels 10, 11, 12, 17, 18, and 23. The proposed boundary meets the RCRA definition and intent of the AOC Policy. The ability to consolidate hazardous remediation waste within the designated AOC will allow interim and final remedial measures to be conducted in a protective, efficient, sustainable and cost-effective manner, and will also reserve CAMU capacity for the management and treatment (if needed) of other hazardous remediation waste that clearly should be segregated from site soils.

The IM Work Plan 2012 also described the intended use of onsite CAMUs to manage remediation waste, consistent with practices at the Facility since the late 1990s. CAMU 1 and 2 were constructed by ASARCO on Parcel 15 and the southwest corner of Parcel 19. CAMU 1 has been closed and the remaining capacity in CAMU 2 will be used to manage remediation waste and debris from the first phases of demolition that are not suitable for salvage and recycling. If additional capacity is needed to manage remediation waste, CAMU 3 will be designed and sized accordingly.

6.2 IM 2013 Remediation Waste Management

The remediation waste expected to be associated with implementation of the 2013 IM components is summarized in Table 6-1 and described briefly in the following paragraphs. Detailed work plans, as appropriate, for each of the components described as follows will be prepared during final design, or will be required submittals as part of the construction contract(s).

TABLE 6-1
Interim Measures Remediation Waste Management

IM Component	Remediation Waste	Disposition
Building and Infrastructure Demolition	Debris[a]	Building debris that is not suitable for salvage or recycling will be evaluated for consolidation as fill within the Area of Contamination (AOC) or placed in Corrective Action Management Unit (CAMU) 2.
	Asbestos-containing material (friable and nonfriable)	Place in CAMU 2.
	Materials contaminated with biological waste material (primarily fecal matter from resident migratory birds)	Place in CAMU 2.
	Lead-based paint materials	Place in CAMU 2.
	Miscellaneous nonliquid and solidified chemicals	Place in CAMU 2.
	Liquid waste	Transport to appropriately permitted offsite disposal facility.
	Universal waste (for example: batteries and mercury-containing equipment)	Transport to appropriately permitted offsite disposal facility.
	Ozone-depleting materials	Transport to appropriately permitted offsite disposal facility.
	Equipment with ionizing radiation sources	Transport to appropriately permitted offsite disposal facility.

TABLE 6-1
Interim Measures Remediation Waste Management

IM Component	Remediation Waste	Disposition
	Toxic Substances Control Act (TSCA) and non-TSCA polychlorinated biphenyl (PCB) waste	If encountered, PCB materials will be transported to an appropriately permitted offsite disposal facility.
PPC Temporary Bypass Construction	Soils[b]	Consolidate within AOC.
Potential CAMU 3 Construction	Soils[b]	Consolidate within AOC.
	Debris[a]	Building debris that is not suitable for salvage or recycling will be evaluated for consolidation as fill within the AOC or placed in CAMU 2.

Notes:

[a] Debris is expected to be primarily concrete, masonry, and steel.

[b] Existing data in this area are limited, but indicate the presence of site-related constituents of potential concern in surface and subsurface soils at concentrations that suggest the material may be characteristically hazardous.

6.2.1 Prickly Pear Creek Temporary Bypass

Construction of the PPC Temporary Bypass is estimated to require the excavation of over 260,000 yd^3 of soil, some of which may be considered characteristically hazardous waste based on the concentrations of site-related COPCs. All excavated materials are considered remediation waste and may be consolidated within the AOC boundary. Appropriately detailed soil and remediation waste management plans will be prepared as part of final design for the IMs, and will include testing as necessary to evaluate protection of human health and the environment and determine the appropriate management of excavated materials.

Final design plans include the following:

- Physical screening will be conducted to segregate material by particle size. Rocks and cobbles would be used for channel stabilization.
- Sampling and analyses will be conducted to identify soil geotechnical properties, as well as COPC concentrations.
  - Stockpiles will be sampled for COPCs, and decisions regarding reuse or consolidation will be made based on the results. For example, soils with concentrations of COPCs exceeding appropriate media cleanup standards will not be used as growth media for the ET Cover because they could come in contact with human and ecological receptors and stormwater.
  - Materials with low hydraulic conductivity will be stockpiled for use in the low-permeability barrier currently contemplated for the northeasterly perimeter of Lower Lake.
  - Soils with sufficient organic content will be stockpiled for use as growth media for the ET Cover.
- Protocols for stockpiling, transportation, and dust suppression to minimize potential contaminant migration during construction will be specified during final design.

6.2.2 Building and Infrastructure Demolition and Utility Relocation

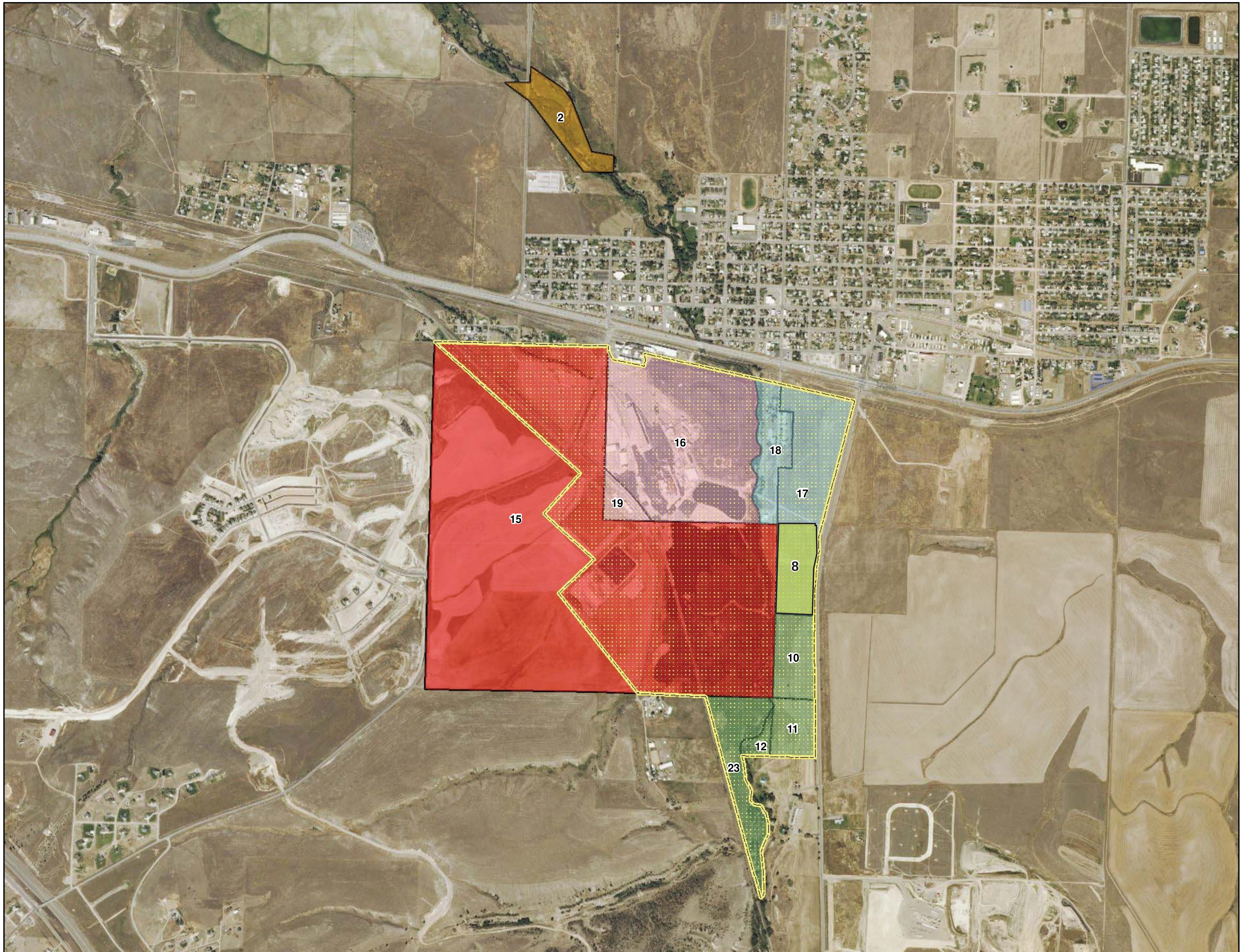
In 2013, most of the remaining buildings and infrastructure at the former Smelter site will be demolished, as previously described. Remediation waste management associated with this work is summarized as follows:

- Consistent with previous demolition work conducted at the site, demolition will encourage the appropriate beneficial reuse of debris and materials recyclable material plans for proper handling of materials believed to have salvage or recycle value.

- Concrete rubble and debris from the OSHB will be evaluated for use as onsite fill. The interior of the OSHB was pressure-washed and decontaminated in 2009 by ASARCO and has been inactive since that time. Given that this work will be performed within the footprint of the AOC, concrete rubble and debris can be stockpiled, consolidated, and used as appropriate for fill below the ET Cover.
- Excavation of soils may be necessary as part of the utility/infrastructure work. Because all of the utility relocation work is being done within the footprint of the AOC, soils that are excavated will be temporarily stockpiled adjacent to the work area and then placed back in the excavation as fill. The existing substation and in-active lines are being removed by NW Energy.

6.3 Corrective Action Management Unit Construction

In the event that construction of a third CAMU proceeds in 2013, remediation waste anticipated to be associated with that work would be limited to excavated soils containing inorganic contaminants and possibly debris encountered during grading activities. Because CAMU 3 is located within the AOC boundary, contaminated soils can be consolidated in appropriate locations (based on site grading needs and constituent concentrations). In the event that debris is encountered, it will be evaluated for potential salvage or recycling value. If debris is not recyclable, it will be placed in CAMU 2 or disposed of in an appropriately permitted offsite facility.



VICINITY MAP

LEGEND

- Portion of Parcel 2 near Prickly Pear Creek
- Portion of Parcel 8 West of State Highway 518
- Parcel 15
- Parcels 16 and 19
- Parcels 17 and 18
- Parcels 10, 11, 12, and 23
- Proposed Area of Contamination Boundary

N

0 750 1,500
Feet

FIGURE 6-1
Proposed Area of Contamination Boundary
Interim Measures Work Plan–2013
East Helena, Montana

CH2MHILL.

SECTION 7

Status of Permitting Activities and Approvals

This section provides an update to the federal, state, and local permit and licensing measures outlined in the IM Work Plan 2012, and discusses the permits under evaluation for 2013.

7.1 Status of 2012 Permitting and Authorization Activities

7.1.1 Prickly Pear Creek Bypass Permits and Authorizations Covered by the Joint Application Process

The *Joint Application for Proposed Work in Montana's Streams, Wetlands, Floodplains, and Other Water Bodies* (Joint Application) is used to simultaneously apply for several different water resource permits from multiple permitting agencies. The Joint Application for the PPC Temporary Bypass project was submitted in September 2012 to the City of East Helena, the U.S. Army Corps of Engineers (USACE), and the Lewis and Clark Conservation District. The permits associated with each agency for the Bypass are described in more detail below.

7.1.1.1 Floodplain Development Permit

The City of East Helena has authority to issue a Floodplain Development Permit for any construction that impacts the designated 100-year floodplain within the city limits; the PPC Temporary Bypass will alter the location and elevation of the regulatory floodplain and thus requires a Floodplain Development Permit. The East Helena Floodplain Coordinator has received the Joint Application, and is awaiting technical input from FEMA, the Montana Department of Natural Resources and Conservation (DNRC) Regional Engineer (Helena Region), and the State Floodplain Engineer before processing the Floodplain Development Permit application. Specifically, FEMA must issue a CLOMR for the Bypass prior to the City initiating review of the Floodplain Permit. As part of the review process, the City will solicit public comments on the application for a 15-day period.

The CLOMR application was submitted to FEMA and the DNRC Regional Engineer in August 2012, and is currently being reviewed by these agencies. The application included the hydraulic models that were developed to produce water surface elevations for the 100-year flood and the associated horizontal limits of inundation. The preliminary floodplain delineation for the Bypass project is shown in Figure 7-1.

7.1.1.2 Federal Clean Water Act, Section 404 Permit

Activities undertaken on a RCRA site as approved or required by USEPA are required to obtain permits under Section 404 of the Clean Water Act (CWA). The CWA Section 404 regulates discharge of dredged or fill material into waters of the United States, including wetlands. The program, regulated by the USACE, strives for no-net-loss of wetland areas. Section 404 regulations require a preconstruction notification (application) and issuance of a permit before impact activities, unless the project is exempt from Section 404 regulation. Discussions with USACE staff indicate that project-specific activities require a general Nationwide Permit (NWP).

Before submitting an application, a wetland survey is carried out to determine the jurisdictional wetland boundaries and areas subject to regulation. A wetland survey for this project was completed in October 2011 and findings summarized in a data summary report. Additionally, the USACE must consider impacts to wetland functions and values when evaluating Section 404 applications. Functions and values have been assessed using the *Montana Wetland Assessment Method* and are also discussed in the data summary report.

As part of their review of the permit application for the PPC Temporary Bypass, the USACE will determine which NWPs and general conditions are applicable to the realignment project. Probable NWPs will be issued for temporary construction, aquatic habitat restoration, cleanup of hazardous and toxic waste, and bank stabilization; additional NWPs may be required based on USACE's review.

7.1.1.3 Montana Natural Streambed and Land Preservation Act (310 Permit)

The Montana Natural Streambed and Land Preservation Act (310 Permit) applies to any nongovernmental entity proposing to work in or near a stream. The purpose of the permit is to minimize soil erosion and sedimentation and to protect and preserve streams. This permit would be administered by the Lewis and Clark Conservation District's Board of Supervisors.

7.1.2 Prickly Pear Creek Bypass Permits and Authorizations Not Covered by the Joint Application Process

The following permits and authorizations are necessary for construction of the PPC Temporary Bypass, but will be obtained outside of the Joint Application process.

7.1.2.1 Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, Threatened, Endangered, and Candidate Species and Critical Habitat Consultation

The Custodial Trust has had several communications with USFWS and USEPA regarding the application of the MBTA to work at the Facility. USFWS has confirmed that IM implementation should be scheduled to avoid disturbances of migratory bird nests during the nesting season.

Threatened, Endangered, and Candidate Species and Critical Habitat have been evaluated as part of the wetland survey and wildlife habitat, and are not present on the project site. A letter of Endangered Species Act (ESA) concurrence was issued by USFWS in September 2012 for the overall project site.

7.1.2.2 Montana Water Use Act (Water Right Permit and Change Authorization)

As noted in the IM Work Plan 2012, the PPC Temporary Bypass project will require two changes to the Point of Diversion (POD). One change will be required to support the Bypass, and another will be required to cover the change associated with the PPC Realignment. Existing water rights for the owners legally tied to the Wilson Ditch Headgate will be affected. Work continues to appropriately address those effects.

7.1.2.3 Montana Dam Safety Act

The following two activities are necessary to complete this activity: (1) contacting the DNRC to request a hazard evaluation, and (2) obtaining a construction permit to work on or around Smelter Dam, or remove it, if required.

Downstream Hazard Evaluation

The purpose of this evaluation will be to determine whether the dam is a high-hazard dam (indicates a potential for loss of life). If the dam is not determined by the DNRC to be high hazard, no dam safety permits are required.

Dam Construction Permit

If the dam is determined to be high hazard, a construction permit issued by DNRC's Dam Safety Program will be required to remove or perform construction on the impoundment.

Operating Permit

Depending on the length of time between hazard classification by DNRC and the construction demolition phase, a dam operating permit may be required, which would include annual owner inspections, 5-year engineer's inspection, and preparation of Operating and Maintenance and Emergency Action Plans.

7.1.2.4 Open-Cut Mining Permit

Following consultation with the Montana Department of Environmental Quality (MDEQ) on the PPC Temporary Bypass project, MDEQ determined that an Open-Cut Mining permit would not be required.

7.2 Anticipated 2013 Permitting and Authorization Activities

7.2.1 Prickly Pear Creek Realignment Permits and Authorizations Covered by the Joint Application Process

The PPC Realignment project will require a slate of permits and authorizations similar to the PPC Temporary Bypass project. Although the realignment will not be constructed until 2014, the required permits must be applied for in 2013. The following permits and authorizations have been identified as necessary for future construction of the PPC Realignment and are covered by the *Joint Application for Proposed Work in Montana's Streams, Wetlands, Floodplains, and Other Water Bodies*.

7.2.1.1 Floodplain Development Permit

The City of East Helena has authority to issue a Floodplain Development Permit for any construction that affects the designated 100-year floodplain within the city limits; the PPC Realignment project will alter the location and elevation of the regulatory floodplain and thus requires a Floodplain Development Permit. The East Helena Floodplain Coordinator will receive technical input from FEMA, the DNRC's Regional Engineer (Helena Region), and the State Floodplain Engineer before processing the Floodplain Development Permit application. Specifically, FEMA must issue a CLOMR for the Realignment before the City initiates review of the Floodplain Permit. As part of the review process, the City will solicit public comments on the application for a 15-day period.

Letter of Map Revision

Once construction activities within the floodplain are completed, a final Letter of Map Revision (LOMR) will be submitted to the floodplain administrator and FEMA to update the effective FIRM mapping. This will result in the approved permanent revision to the FIRM map, reflecting the as-built condition of the PPC Realignment.

7.2.1.1 Federal Clean Water Act, Section 404 Permit

It is anticipated that a general NWP will be required for the PPC Realignment project. As part of its review, the USACE will determine which NWPs and general conditions will be applicable to the PPC Realignment. Probable NWPs will be issued for temporary construction, aquatic habitat restoration, cleanup of hazardous and toxic waste, and bank stabilization; additional NWPs may be required based on USACE's review.

7.2.1.2 Montana Stream Mitigation Procedure

The *Montana Stream Mitigation Procedure* recently developed by the Montana Office of USACE, is used to quantify the adverse impacts (debits) and the acceptable compensatory mitigation (credits) in projects with more than minimal impacts to a stream. In the case of the PPC Realignment project, from the irrigation diversion to the dam, the Montana Stream Mitigation Procedure would likely afford the project an increase in credits necessary to offset other impacts.

7.2.1.3 Montana Natural Streambed and Land Preservation Act (310 Permit)

The Montana Natural Streambed and Land Preservation Act (310 Permit) applies to any nongovernmental entity proposing to work in or near a stream. The purpose of the permit is to minimize soil erosion and sedimentation and to protect and preserve streams. This permit would be administered by the Lewis and Clark Conservation District's Board of Supervisors.

7.2.1.4 Short-Term Water Quality Standard for Turbidity (318 Authorization)

Any entity initiating construction activity that would cause unavoidable, short-term, or temporary violations of state surface water quality standards for turbidity is required to have 318 Authorization from MDEQ. The purpose of the law is to allow short-term water quality turbidity associated with construction activities, while protecting water quality.

The Authorization is made based on a recommendation by Montana Fish, Wildlife & Parks, following their review of the 310 Permit application. No formal application process is involved; however, MDEQ could stipulate project actions for approval.

7.2.1.5 Montana Fish, Wildlife & Parks—Fish Habitat Consultation

Agency consultation regarding potential impacts to fish habitat would be required. This would be covered under the Montana Stream Mitigation Procedure (Section 404 application) and the 310 Permit.

7.2.2 Prickly Pear Creek Realignment Permits and Authorizations Not Covered by the Joint Application Process

The following permits and authorizations are necessary for future construction of the PPC Realignment, but will be obtained outside of the Joint Application process.

7.2.2.1 Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, Threatened, Endangered, and Candidate Species and Critical Habitat Consultation

The Custodial Trust has had several communications with USFWS and USEPA regarding the application of the MBTA at the Facility. USFWS has confirmed that IM implementation should be scheduled to avoid disturbances of migratory bird nests during the nesting season.

Threatened, Endangered, and Candidate Species and Critical Habitat have been evaluated as part of the wetland survey and wildlife habitat, and are not present on the project site. A letter of Endangered Species Act (ESA) concurrence was issued by USFWS in September 2012 for the overall project site.

7.2.2.2 Open-Cut Mining Permit

Following consultation with MDEQ on the PPC Temporary Bypass project, MDEQ determined that an Open-Cut Mining permit would not be required. It is expected that MDEQ will issue the same determination for the PPC Realignment because of the noncommercial nature of the activities.

7.2.3 Permits and Authorizations for Other 2013 Site Activities

Other 2013 site activities, such as the replacement of the HDS Plant and the modifications to Tito Park, will require permits from federal and state agencies.

7.2.3.1 MPDES Permits

The goal of the MPDES program is to control point source discharges of wastewater such that water quality in the receiving streams is protected. The Custodial Trust holds the following two MPDES permits: (1) an individual permit (MT0030147) that provides authorization to discharge treated stormwater under the MPDES program from the wastewater treatment plant to an outfall on Lower Lake, and (2) authorization under the General Permit for Stormwater Discharges associated with industrial activity
(MT-R000072).

In addition to these two permits, the possibility of replacing the HDS Plant could potentially lead to two additional permits and amending the existing permits within the MPDES program. The following two additional permits may be required depending on scope and scale of project activities: (1) MPDES Construction Dewatering General Permit (MTG070000), and (2) Stormwater General Permit for Construction Activity (MTR 100000). Details on existing permits, potential permit amendments, and potential new permits follow.

7.2.3.2 Evaluation of the Existing MPDES Individual Permit MT0030147

The Custodial Trust currently holds an MPDES Minor Industrial Individual Permit No: MT0030147 for authorization to discharge under the MPDES program. This individual permit regulates wastewater discharges from point sources that do not fall under the guidelines of General Permits. Individual permits undergo a more rigorous process and address specific conditions of the facility or activity. This permit allows for the discharge of treated stormwater runoff to an outfall located on Lower Lake. The current permit is valid until July 31, 2015. Modifications to this permit may be necessary if the outfall location is moved because of the dewatering and excavation activities that may take place on Lower Lake. As a part of the more rigorous nature of the individual permit, a public comment process may be required to change the outfall location. This permit will need to be modified on a temporary basis, but ultimately eliminated once the industrial site stormwater collection and treatment facility is replaced with a sitewide ET cap.

7.2.3.3 Modification of Existing MPDES Industrial Activity Permit MTR000072

The Custodial Trust currently holds an MPDES General Permit for Industrial Activity. Discussions with Brian Heckenberger, MDEQ Water Protection Bureau staff, revealed that this General Permit was required in addition to the MPDES Individual Permit (MT0030147) because of the exposure of industrial materials (slag piles) to rain, snow, snowmelt, or runoff. When this permit is renewed, it will require an updated and revised SWPPP that meets the stated requirements.

7.2.3.4 MPDES Construction Dewatering Permit MTG070000

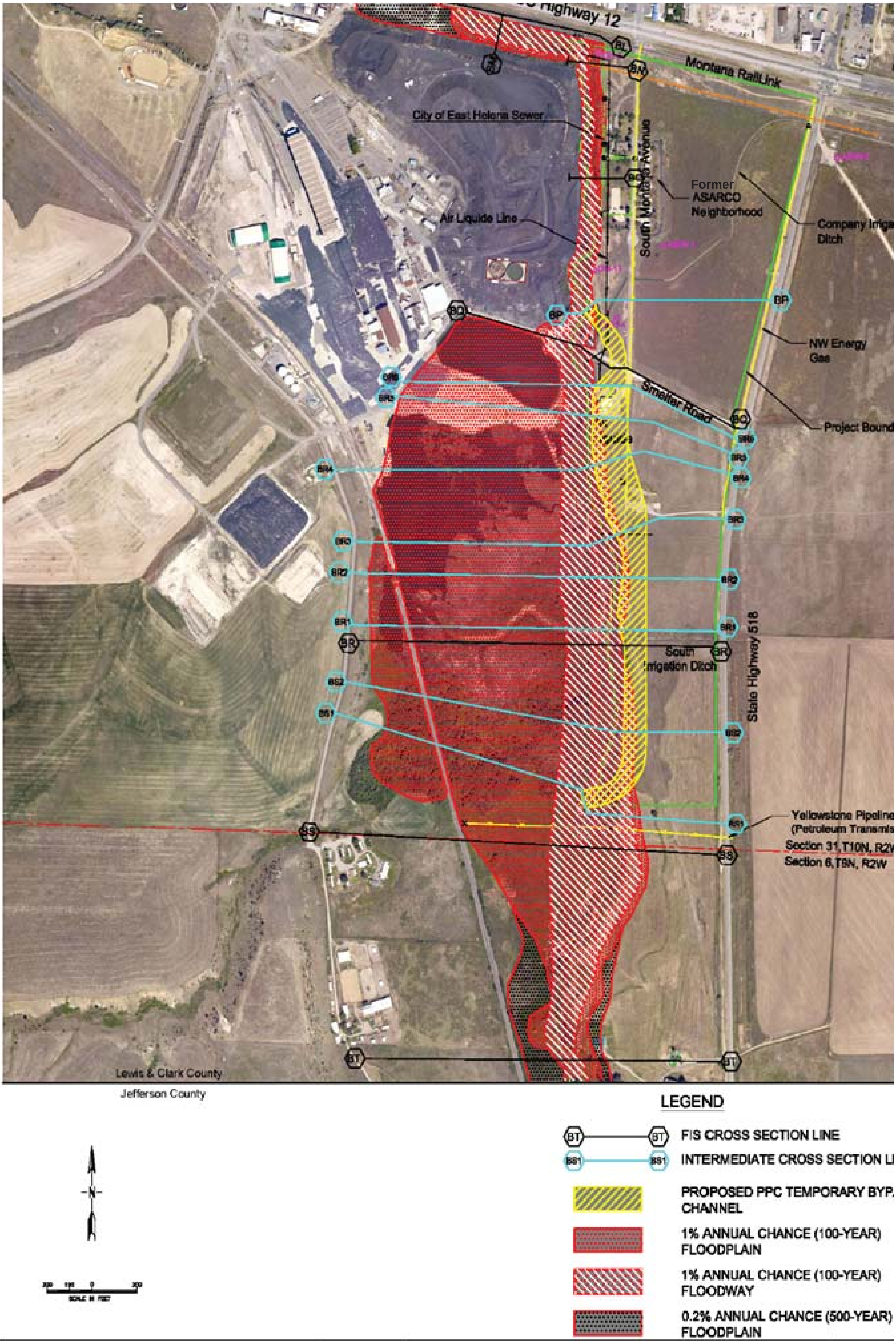
The purpose of the MPDES Construction Dewatering General Permit is to regulate the discharge of wastewater from dewatering surface water from construction sites in accordance with effluent limitations, monitoring requirements, and other conditions. Effluent characteristics (water quality data less than 1 year old) must be provided as part of the application for coverage under this permit.

7.2.3.5 MPDES Construction Activity Stormwater General Permit MTR100000

Construction activity that results in the “disturbance” of equal to or greater than 1 acre of total land area necessitates coverage from this permit. Obtaining coverage under this permit would require preparation of a Notice of Intent and a SWPPP.

7.2.3.6 Montana Department of Transportation Permits

Any work done within the Montana Department of Transportation (MDT) right-of-way will require the appropriate permit. MDT will be contacted to secure all required permits in advance of starting construction activities.



MORRISON MAIERLE, INC.
An Employee-Owned Company

PRICKLY PEAR CREEK TEMPORARY BYPASS CHANNEL
EAST HELENA MONTANA

FIGURE 7-1
Preliminary Floodplain Delineation
Interim Measures Work Plan–2013 East Helena, Montana

1

SECTION 8

Project Management and Schedule

This section provides an overview of project management activities and the proposed schedule for 2013 IM implementation. Organization and lines of communication, public participation, documentation and reporting, and the preliminary schedule are described.

The Custodial Trust will manage all IM activities as part of the responsibilities and obligations set forth in the Settlement Agreement and First Modification. The Custodial Trust will communicate relevant information about IM task plans, results, and progress to USEPA, as Lead Agency, as well as to the federal and state beneficiaries of the Custodial Trust. Communication will occur on a frequent and timely basis, to review progress on the IMs, to solicit input from the beneficiaries, and to ensure that they are kept well informed of activities onsite.

8.1 Organization and Lines of Communication

The Custodial Trust will procure the services of consultants and contractors to implement the IMs as efficiently and cost-effectively as possible. Figure 8-1 shows the current overall Project Organization Chart and the lines of communication. Table 8-1 shows the anticipated consultant leads for IM design and construction.

TABLE 8-1
Interim Measure Consultant Leads

Name	Lead Contact	Description of Role
CH2M HILL	Jay Dehner: 509-979-5733	Project management and overall engineering lead for all work
Morrison Maierle Inc.	Mark Brooke: 406-495-3469	Engineering design
Pioneer Technical Services	Joel Gerhart: 406-490-2530	Natural resources, stream geomorphology and engineering design
Hydrometrics	Bob Anderson: 406-443-4150	Hydrogeology and engineering design
Applied Geomorphology	Karin Boyd: 406-587-6352	Stream geomorphology
NewFields	Cam Stringer: 406-549-8270	Groundwater flow and contaminant transport modeling
Confluence	Jim Lovell: 406-585-9500	Stream geomorphology

8.2 Public Participation

Public involvement is a critical part of the overall cleanup process for the East Helena Site. General communication with the public will continue to follow the *Draft Community Relations Plan, Former ASARCO Smelter Facility, East Helena, Montana* prepared by the Custodial Trust (2010), as well as the requirements of the First Modification to the 1998 Consent Decree. An informational meeting was held in November 2012 to provide the community with an overview of the 2013 IM work described herein.

8.3 Documentation and Reporting

The following IM documentation is under development:

- Contract scopes of work and schedules
- Engineering technical reports and memoranda
- Modeling results (including PPC flow, ET Cover System, and groundwater flow/contaminant transport)
- Permit application packages
- Detailed engineering designs (plans and specifications)
- Construction contract packages (drawings and specifications)
- Operation and maintenance plans
- Record drawings and contract close-out documents

Core plans that have been developed for the Facility will be incorporated by reference, or amended as appropriate, to ensure that IM activities follow relevant protocols and methods. Core plans include the following:

- Health and Safety Plan for the East Helena Site
- Quality Assurance/Quality Control Plan
- Sampling and Analyses Plans

IM progress will be summarized in the monthly progress reports.

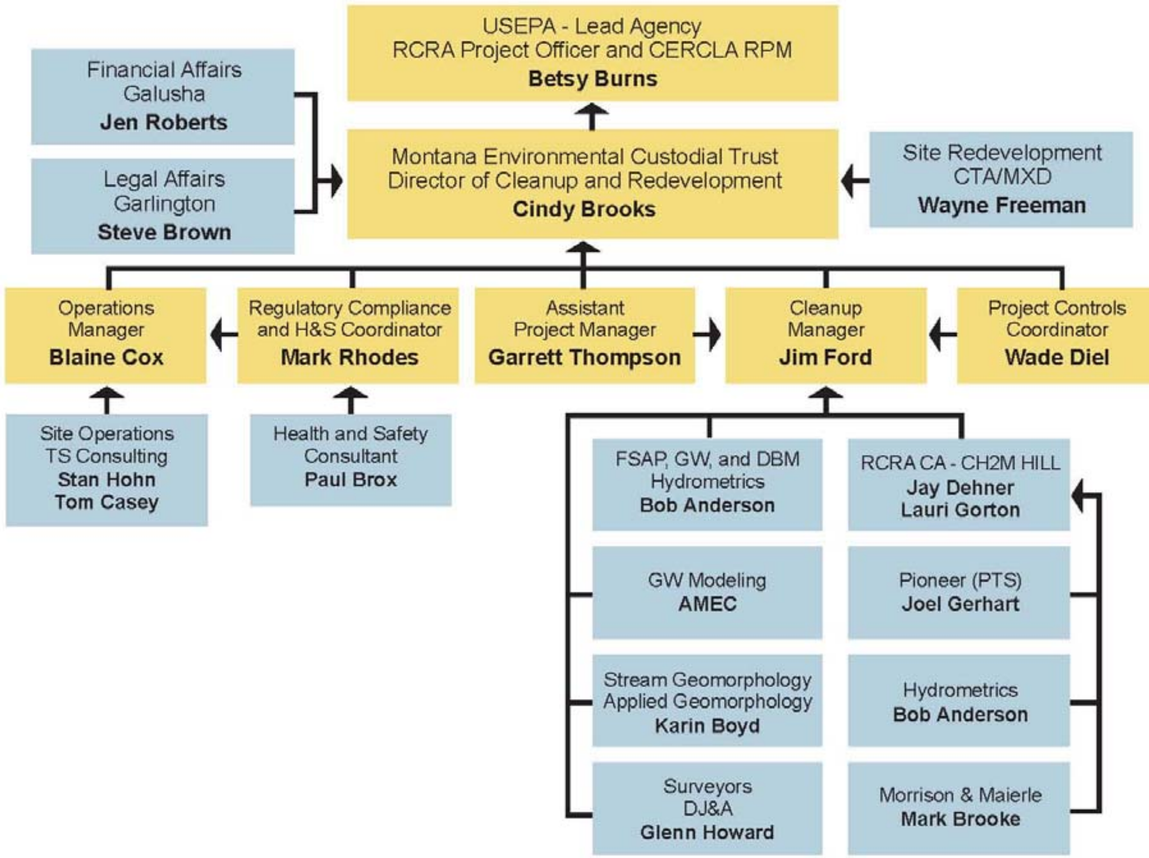
8.4 Preliminary Interim Measure Implementation Schedule

Table 8-2 summarizes key dates for the proposed 2013 IM implementation and provides schedule updates for the work proposed and approved in the IM Work Plan 2012. The schedule is considered a living document and will be revised on a regular basis as needed to reflect planned implementation requirements for each IM. The preliminary schedule was developed in coordination with other ongoing work being conducted by the Custodial Trust pursuant to the First Modification. The schedule for these activities is subject to refinement as input is received from the Trust, beneficiaries, and other stakeholders.

TABLE 8-2
Summary of Proposed 2013 Implementation Schedule

East Helena Facility Planning and Construction Activities	Start	End
2013 IM Work Plan		
Public Comment Period	November 2012	December 2012
U.S. Environmental Protection Agency Approval		31 January 2013
City of East Helena Waterline Relocation		
Bidding and Award	December 2012	March 2013
Construction	March 2013	June 2013
Demolition Phase 1		
Bidding and Award	October 2012	January 2013
Construction	April 2013	August 2013
Demolition Phase 2		
Bidding and Award	April 2013	July 2013
Construction	July 2013	November 2013
Prickly Pear Creek Temporary Bypass		
Bidding and Award	February 2013	April 2013
Construction	June 2013	November 2013

FIGURE 8-1
Project Organization and Lines of Communication



SECTION 9
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Appendix A
Results of Upper Lake Drawdown Testing—September 2012

Hydrometrics, Inc.
consulting scientists and engineers

MEMORANDUM

DATE: September 20, 2012

TO: Jim Ford, Montana Environmental Trust Group

FROM: Bob Anderson, Hydrometrics, Inc.
Mark Walker, Hydrometrics, Inc.

SUBJECT: Upper Lake Drawdown Test Technical Memorandum –DRAFT

EXECUTIVE SUMMARY

The Montana Environmental Trust Group is conducting an Upper Lake drawdown test at the former Asarco smelter site (the plant site) in East Helena, Montana. Upper Lake is a relatively large surface water feature at the south (topographically and hydrologically upgradient) margin of the plant site. Leakage from Upper Lake has long been recognized as a source of recharge to the plant site groundwater system, where the interaction of groundwater with metals-contaminated soils has negatively impacted groundwater quality. The purpose of the Upper Lake drawdown test is to simulate, at least partially, the effects of eliminating recharge from Upper Lake on plant site groundwater levels, flow rates, and contaminant loading to groundwater. This information is being used in planning and implementation of remedial measures for the site.

The Upper Lake drawdown test has involved three distinct phases, including passive lake dewatering achieved by shutting off the diversion inflow from Prickly Pear Creek, lowering Prickly Pear Creek adjacent to the plant site, and pumping from the lake to expedite lake level drawdown. The first phase of the test began on 11/1/2011 and continued through 3/26/12. The creek lowering phase overlapped with the passive dewatering phase and occurred from 12/21/11 through 2/24/12. The third (lake pumping) phase was initiated on 3/26/12 and continues to date. Data collection during the test has included continuous water level monitoring at a total of 35 groundwater and surface water sites instrumented with pressure sensitive transducers, and manual measurements at an additional 20 sites. The water level data is intended to quantify the groundwater level declines across the plant site, and determine effects of the lake drawdown on hydraulic gradients and groundwater flow rates across the plant site.

As of September 13, 2012, the water level in Upper Lake had declined by 4.9 feet since the November 1, 2011 test startup. Groundwater levels during this time have declined by four to five feet in the south portion of the plant site, three to four feet in the central plant site, and four to six feet in the northwest portion of the plant site. Water level declines in the south plant site are attributable to the proximity of this area to Upper Lake while the larger declines in the northwest plant site are attributable to the Upper Lake drawdown, as well as a lack of flow in Wilson Ditch. The lack of ditch flow in 2012 is related to the Upper Lake drawdown test as Wilson Ditch is fed by a headgate on Upper Lake. Water levels in the northeast portion of the plant site (beneath the slag pile) declined by less than one foot, suggesting the shallow groundwater system in this area has limited interaction with water levels in Upper Lake and the south plant area.

Current plans for the East Helena Smelter site include permanent elimination or reduction of recharge from Upper Lake to the plant site groundwater system, lowering the water level in Prickly Pear Creek adjacent to the plant site by removing a small dam, excavation of contaminated soils in the south plant area, placement of a low permeability zone to further limit groundwater flow through the plant site, and possible elimination of Wilson Ditch. Collectively, these actions are referred to as the South Plant Hydraulic Control (SPHC) project. In order to assess the effectiveness of the proposed SPHC, information gained from the Upper Lake drawdown test to date was used to estimate total declines in groundwater levels expected through implementation of the SPHC. Projected water level declines range from approximately ten feet in the south plant area, four to five feet in the central plant area, and up to six feet in the northwest plant area. Groundwater levels in the northeast plant area (beneath the slag pile), are expected to decline by two feet or less. Lowering the water table will not only reduce the total groundwater flow rate or flux through the plant site, but will also significantly reduce the magnitude of groundwater interaction with the most highly contaminated soils on the plant site. These two effects should combine to reduce the load (pounds/day) of contaminants in plant site and downgradient groundwater

Additional information gained from the Upper Lake drawdown test to date includes identification of potential preferential groundwater flow paths through the plant site, portions of the plant site where groundwater is more closely connected to Prickly Pear Creek, and general groundwater flow patterns through the site. Following completion of the water level recovery phase of the test (Fall 2012), effects of the Upper Lake drawdown test and projected effects of the SPHC on groundwater levels, flow rates and patterns, and groundwater quality will be evaluated further.

1.0 INTRODUCTION

Upper Lake has previously been identified as a source of recharge to the Upper Aquifer, or unconfined groundwater system overlying the Tertiary ash/clay layer at the former East Helena smelter site (the plant site). Indications that Upper Lake provides recharge to the plant site groundwater system include its location at the extreme southern (upgradient) end of the plant site, and the elevated lake level resulting from construction of raised ground levels and berms around the lake perimeter. Although these physical attributes indicate that Upper Lake increases recharge to the plant site Upper Aquifer (as compared to pre-lake conditions), the magnitude of recharge attributable to Upper Lake has not previously been quantified. In order to assess the rate of groundwater recharge from Upper Lake to the plant site groundwater system, METG initiated an Upper Lake drawdown test to document the plant site groundwater system response to variations in the Upper Lake water level. The Upper Lake drawdown test was initiated in fall 2011 and continues to date. This technical memorandum describes the Upper Lake drawdown testing procedures and results to date. Interpretation of the test results is also presented along with preliminary implications of the potential effectiveness of the proposed South Plant Hydraulic Control (SPHC) interim measures. Additional data review and interpretation will occur following the water level recovery (partial lake refilling) phase of the test, scheduled to begin in October 2012.

1.1 DRAWDOWN TEST OBJECTIVES

Design and planning of the Upper Lake drawdown test is covered in two memoranda submitted to METG by Hydrometrics (dated August 5, 2011 and October 19, 2011), with subsequent input from the project team. Besides quantifying effects of Upper Lake dewatering on plant site groundwater levels, the drawdown test is also intended to provide additional information on the overall plant site hydrogeologic system. Specific objectives of the drawdown test as outlined in the August 5th memorandum include:

1. Quantify the Plant Site groundwater system response to lowering of the Upper Lake water level.

2. Identify potential preferential groundwater flow paths through the plant site based on the magnitude and timing of groundwater level responses in individual wells.

3. Refine plant site aquifer hydraulic conductivity estimates based on the groundwater level response to lake dewatering in various portions of the site, if test data allows.

This memorandum focuses on objective #1 to aid in planning and implementation of the SPHC activities. Objectives 2 and 3 are also discussed as relevant to the SPHC project, and will be evaluated further in support of other interim and corrective measures activities and as available information allows.

1.2 BACKGROUND

Upper Lake lies within the Prickly Pear Creek floodplain at the south end of the former smelter or plant site (Figure 1). The lake area and associated marsh system to the immediate south lie within an area of recent active channel migration, resulting in the lake/marsh area being largely underlain by alluvial sands and gravels. Based on available information, the sand/gravel is overlain by 2 to 5 feet of silt/clay. Since the lake/marsh area is part of the active creek floodplain, Prickly Pear Creek has meandered through the area in the recent past. Based on review of historic aerial photos and observations of the lake at its current drawn down level, two former creek channels are evident in the lake/marsh area as shown on Figure 1. Due to the relatively high permeability of former channel sediments, the channels may represent preferential flow paths for shallow groundwater through the lake/marsh area and northward through the plant site. One of these channels extends through the west half of the lake and projects northwestward through the west plant site while the second former channel traverses the east half of the lake and projects through Tito Park (Figure 1).

Upper Lake was initially formed by diversion of water from Prickly Pear Creek into what originally was most likely a large marsh complex with limited open water. The original lake was considerably smaller in size than its present day configuration, with the lake area (and elevation) increased through continued placement of fill north of the lake (Tito Park area), and construction of an earthen berm (east berm) between the lake and Prickly Pear Creek around 1985. These "improvements" were implemented in part to provide a suitable water source for operation of the Acid Plant and other facility processes. The Upper Lake water level is controlled by two large outlet culverts in the east berm, with outflow through the culverts returning to Prickly Pear Creek. During the irrigation season, lake water typically is also diverted into Wilson Ditch through a headgate on the west side of the lake. Figure 1 shows the present-day (pre-drawdown test) Upper Lake configuration and various features relevant to this discussion.

With enlargement and raising of the lake level during (and prior to) the mid-1980s, leakage from the lake to the plant site is expected to have increased due to the greater hydraulic gradient and wetted surface area of the lake. Regular dredging of sediments from the northwest portion of the lake (to facilitate pumping for plant make-up water) would also have increased the leakage rate as compared to current conditions. Since the 2001 plant shutdown, Upper Lake has partially filled in with fine grained (low permeability) sediments, reducing the rate of leakage as compared to pre-2001 conditions. Thus, the rate of leakage and groundwater recharge from Upper Lake to the plant site groundwater system has most likely varied over time.

1.3 DEVELOPMENT OF UPPER AND LOWER LAKE

The earliest records uncovered to date regarding Upper Lake include reference to 1938 and 1959 measurements of the lake depth, and various activities associated with sediment control from upstream placer mining activities. At that time, Upper Lake and Lower Lake were physically connected as one lake with the two sections referred to as the south and north lakes, respectively. In the 1930s, upstream placer mining operations on Prickly Pear Creek caused turbidity problems in the creek and the plant site water system. In 1934, a ten-foot wide ditch was excavated from Prickly Pear Creek to the south end of Upper Lake to utilize the lake as a settling basin. This resulted in infilling of Upper Lake with sediment and a reduction in the lake depth and area. This information shows that Upper Lake was a significant water feature as far back as the 1930s with the lake depth, surface area and lakebed conditions varying over time. These variations in lake conditions would have affected leakage from the lake to the plant site groundwater system over the past several decades.

In 1985, the inlet channel and diversion structure on Prickly Pear Creek were improved by Asarco to better control inflow to Upper Lake. The east berm and outflow culverts were also constructed at that time resulting in an increase in the normal operating level of the lake, and presumably increased leakage from the lake to the plant site groundwater system. With shutdown of the smelter in 2001 and cessation of lake dredging, siltation of the lake bottom increased, thereby causing a reduction in the rate of leakage from the lake.

Figure 2 includes a sequence of aerial photographs from 1955 to 2011 showing the Upper Lake expansion over time. Key points of interest in the photos include:

- In 1955, Upper Lake and Lower Lake were connected by a narrow channel. Upper Lake was significantly smaller in size and restricted to the far western portion of the current lake area as compared to the later photos.
- By 1964, the area between the two lakes had been filled in. The Upper Lake surface area is notably larger than in 1955.
- The 1976, 1978 and 1980 photos look very similar to 1964 with no significant changes apparent in Upper or Lower Lake.
- Between 1980 and 1987, the enlarged inlet channel and east berm become evident and the Upper Lake level increases as shown by the expanded surface area.
- Between 1987 and 2011 the surface area (and water level) in Upper Lake shows a steady increase, possibly due to siltation of the lake bottom after the 2001 plant shutdown.

This evolution of the Upper (and Lower) Lake surface area and water level has undoubtedly affected groundwater flow through the plant site over the past several decades.

1.4 GENERAL LAKE HYDROLOGY

Figure 3 shows the three general flow paths by which seepage exits Upper Lake. The first flow path is located in the northwest corner of the lake upgradient of the former acid plant. This location corresponds to one of the former creek channels noted in Figure 1 and is believed to represent a preferential flow path from Upper Lake to the plant site. Lake seepage along this flow path flows northwestward through the former acid plant area and associated contaminated soils. The second flow path occurs northward through Tito Park to Lower Lake. Although flow between the two lakes most likely occurs throughout Tito Park, the rate of flow is probably greatest along any preferential flow paths, such as the former creek channel shown in Figure 1, and in the eastern part of Tito Park where the hydraulic gradient would be greatest due to the shorter distance between the two lakes. Installation of the acid plant sediment drying area (APSD) slurry wall (Figure 3) has undoubtedly altered the direction and possibly the rate of recharge from Upper Lake to the plant site since construction of the slurry wall in 2006.

The third main route for seepage out of the lake is through the east berm to Prickly Pear Creek. Seepage through this area is potentially significant due to the presumably coarse and permeable nature of the fill material used to construct the berm, and the potentially high gradient from the lake to the creek. Under normal conditions, The Upper Lake water level is three to five feet higher than the adjacent creek level, resulting in hydraulic gradients on the order of 0.1 feet/feet from Upper Lake to the creek. Based on the east dike dimensions (350 feet long and 3 feet high below the water level) and an assumed hydraulic conductivity of 200 ft/day, seepage rates through the dike may be on the order of 100 gallons per minute (gpm) or more when the lake is at full pool, or about 3920 feet elevation. An additional component of direct seepage from the lake when at full pool is westward seepage into the tertiary sediments forming the west lake shoreline. This seepage component is expected to be relatively small due to the lower hydraulic conductivity of the tertiary sediments as compared to the alluvial sediments or fill material present in the other seepage areas.

Figure 4 shows a schematic cross section from south to north through the Upper Lake area (see cross section trace on Figure 3). Key points on this figure include the alluvial (Qal) gravel underlying Upper Lake, and the continuous silt/clay layer (lake sediments) separating Upper Lake from the underlying gravels. The documented thickness of the silt/clay layer ranges from about 60 inches at the deeper north end of the lake, to about 40 inches at piezometer ULM-PZ-1 near the head of Upper Lake. Based on available information, the low permeability lakebed sediments are believed to inhibit downward leakage of the lake water to the underlying groundwater system, or upward seepage into the lake. Therefore, recharge from the lake to the plant site groundwater system occurs primarily via seepage through the north lake shoreline. As shown in Figure 4, the composition of the lake shoreline varies from relatively high permeability fill material on the upper bank, to low permeability silt/clay on the lower portion of the bank. This causes the rate of leakage to decrease as the lake level drops below the fill/silt contact.

The lack of subsurface leakage into or out of Upper Lake (at least at lower lake levels) is confirmed by measurements recorded on July 11, 2012. At that time, the lake water level was relatively stable at 3915.75 feet, similar to that shown for 7/24/12 on Figure 4. Upper Lake was being dewatered through pumping at that time with the pumping rate at 30 gpm. Surface water inflow from a small creek into the south end of the lake was measured at 36 gpm. The close correlation between the creek inflow rate and the pumping outflow rate under steady state water level conditions suggests minimal seepage into or out of the lake was occurring at that time (evaporation is assumed to be negligible given the small surface area of the lake at that time). Based on the saturated conditions in the alluvial gravels immediately north of Upper Lake (i.e., well DH-20 in Figure 4), this information suggests that groundwater underflow through the alluvial gravels underlying Upper Lake may persist even after Upper Lake has been permanently dewatered.

2.0 UPPER LAKE DRAWDOWN TEST PROCEDURES

The Upper Lake drawdown test involved three distinct phases, including passive lake dewatering achieved by shutting off the diversion inflow from Prickly Pear Creek, temporarily lowering Prickly Pear Creek adjacent to the plant site, and pumping from the lake to expedite lake level drawdown. The drawdown test schedule and monitoring program are summarized below.

2.1 UPPER LAKE DRAWDOWN TEST SCHEDULE

The Upper Lake Drawdown Test was initiated in fall 2011 with background (pre-drawdown) water level monitoring conducted in October. Following background data collection, the "passive" dewatering phase of the test began on 11/01/11 when the inlet diversion from Prickly Pear Creek to Upper Lake was shut off. Immediately prior to closing the diversion gates, measured inflow to Upper Lake from the creek was 30 cfs (13,440 gpm), which represents about half of the creek flow above the diversion gate at that time. Following closure of the diversion gates about 20 gpm flow remained in the Upper Lake inlet channel due to minor leakage around the gates. The diversion gates have remained closed with about 20 gpm leakage or less since 11/01/11 (Table 1).

The second phase of the test included lowering the Prickly Pear Creek stage above the Smelter Dam to assess the plant site groundwater and Upper Lake level response. The creek level was lowered by as much as eight feet (3915 feet to 3907 feet elevation) by incrementally opening the lower gates on the smelter dam. The creek lowering phase began on 12/21/11 and ended (by closing the lower gates) on 2/24/12. The creek level at the smelter dam has remained at 3915 to 3916 feet since 2/24.

The third phase of the drawdown test involved pumping water from Upper Lake to expedite the lake drawdown. After several months of passive dewatering, the rate of lake level decline slowed considerably leading to the need for pumping. Pumping was initiated on March 26, 2012 with the primary pump intake located in the west half of Upper Lake and a secondary pump located in the east half of the lake. The primary pump has operated more or less continuously since 3/26/12 with relatively few interruptions. The secondary pump was operated on a periodic schedule (typically during normal working hours each day) from 3/26/12 through 4/9/12, after which use of the secondary pump was discontinued. For the

TABLE 1. UPPER LAKE DRAWDOWN TEST SCHEDULE

Test Phase/Milestone	Begin	End	Comments
Background Monitoring	10/1/11	10/31/11	Documents background water level trends leading up to test.
Shut Off Prickly Pear Creek Inflow	11/01/11		Closed PP Ck diversion to Upper Lake inlet channel
Passive Drawdown Phase	11/01/11	3/26/12	Prickly Pear Ck inlet diversion shut off and lake allowed to passively dewater through seepage to subsurface.
Prickly Pear Creek Drawdown Phase	12/21/11	2/24/12	Prickly Pear Creek stage lowered at smelter dam on 12/21/11 to assess effect on groundwater levels. Creek level raised back up on 2/24/12. PP Ck diversion inlet remains closed.
Upper Lake Pumping	3/26/12	Ongoing	Includes continuous pumping from Upper Lake to expedite lake dewatering with diversion inlet remaining closed.

majority of the pumping period, each pump typically discharged between 80 to 120 gpm, with the discharge water piped to an infiltration basin near Prickly Pear Creek. Currently, the primary pump is operating continuously at approximately 15 gpm to maintain a steady state lake level.

2.2 MONITORING PROGRAM

The drawdown test monitoring program is focused primarily on measurement of water levels throughout and peripheral to the plant site. Water levels are measured continuously at a total of approximately 35 groundwater and surface water sites instrumented with pressure sensitive transducers. The continuous water level data is augmented with bi-weekly manual measurements at an additional 20 sites. The water level data is intended to quantify the groundwater level declines across the plant site, and determine effects of the lake drawdown on hydraulic gradients and groundwater flow rates across the plant site. Figure 5 shows the drawdown test monitoring network.

3.0 DRAWDOWN TEST RESULTS

The drawdown test water level monitoring results (to date) are summarized below, with data evaluation and interpretation presented in the following section (Section 4.0). For discussion purposes, the water level data are discussed separately by area, including the south plant area or south zone (Tito Park, Upper Lake, Lower Lake and Phase I/II CAMU area), the central plant zone, and the north plant zone (Figure 5). Water level declines measured during the course of the drawdown test (10/31/11 to 9/13/12) are discussed for each area. The plant site water level changes measured since the start of the test are referred to as water level declines as opposed to water level drawdown, since the measured water level changes likely include some component of seasonal (and potentially longer-term) water level trends, in addition to any lake drawdown-induced water level changes. As discussed in the following section, water level data from late summer/fall 2012 as well as water level recovery data will be required prior to full evaluation of lake drawdown-induced groundwater level changes on portions of the plant site.

3.1 SOUTH PLANT AREA

Primary water level monitoring sites in the south plant area include Upper and Lower Lake, Prickly Pear Creek at (immediately upstream of) the smelter dam, and nine monitoring wells in and around Tito Park. In addition, all 11 CAMU monitoring wells (MW wells on Figure 5) are included in the south plant area for discussion purposes. The primary water level monitoring sites are described in Table 2.

Water level declines measured between 11/01/11 (when diversion inflow to Upper Lake was shut off) through 9/13/12 in the south plant area ranged from 5.10 feet at well APSD-9 (located immediately north of Upper Lake), to 0.93 feet at well APSD-8 (between Lower Lake and Prickly Pear Creek). Water level declines at other notable sites include 4.84 feet at Upper Lake, 3.46 feet at Lower Lake, 3.58 feet at well DH-20 (between Upper Lake and the Acid Plant area), and 3.29 feet in well DH-3 (west of Upper Lake). Hydrographs for select south zone wells are included in Figure 6.

As shown on Figure 6, south plant water levels responded very quickly to the onset of Upper Lake dewatering, especially at wells APSD-9 and APSD-10 along the north Upper Lake shoreline. By mid-November, the Upper Lake water level stabilized at about 3918 feet and remained stable through December, while Lower Lake and groundwater levels throughout the south plant area continued to decrease.

Lowering Prickly Pear Creek above the smelter dam as of 12/20/11 had a notable effect on water levels. Most notable is well APSD-8 (located between Lower Lake and the creek, Figure 5), which dropped about 3.5 feet during the creek lowering phase of the test and fully recovered within about a week after the creek level was raised back up on 2/24/12. As shown on Figure 6, water levels at all other sites were influenced by the creek lowering including well DH-20, located on the west side of the plant site. Interestingly, the Upper Lake water level showed very little response to creek lowering, indicating leakage from the lake to the creek through the east berm is minimal, at least at reduced lake levels of about 3918 feet or lower.

The Upper Lake water level was generally stable from mid-November (about two weeks after inflow to the lake was shut off) through mid-March. With the onset of pumping from the lake on March 26, 2012, the Upper Lake level again began to drop, followed by similar declines in Lower Lake and the south plant monitoring wells. As shown on Figure 6, Upper Lake, Lower Lake and groundwater within Tito Park (APSD wells on Figure 6) have all

TABLE 2. DRAWDOWN TEST WATER LEVEL MONITORING SITES AND WATER LEVEL DECLINES FROM 10/31/11 THROUGH 9/13/12

Monitoring Site	Location	Depth Below Ground Surface (feet)	Net Water Level Decline (feet) 10/31/11 -9/13/12
South Plant Site			
Upper Lake	South Plant Area	NA	4.84
Lower Lake	South Plant Area	NA	3.46
APSD-8	Between Lower Lake and PP Ck	15	0.93
APSD-9	Tito Park	16	5.10
APSD-10	Tito Park	16	4.99
APSD-12	Tito Park	15.5	3.79
DH-3	West of Upper Lake	54	3.29
DH-20	Northwest of Upper Lake	31	3.58
MW-6	Between Plant Site and Phase I CAMU	40	3.88
MW-11	West of Phase II CAMU	70	0.38
Central Plant Site			
DH-19R	Former Acid Plant	25	3.35
DH-4	North of Lower Lake	23	0.95
DH-42	Former Acid Plant	34	3.55
DH-2	West of Plant Site	65.5	3.62
DH-71	North of Former Acid Plant	34	3.78
DH-73	Former Zinc Plant area	48	3.52
DH-68	South end of slag pile	50	0.42
EH-204	West of Plant Site	65	5.48
North Plant Site			
DH-17	Northcentral Plant Site	41	5.18
DH-66	NW of Ore Storage Building	48	5.50
DH-49	North Plant Site	34	5.55
DH-51	North Plant Site	34	5.02
DH-6	Between slag pile and Highway 12	25	3.65
DH-15	Between slag pile and Highway 12	50	3.65

NA-Not Applicable

converged to a similar elevation of about 3915 feet. This convergence of water levels has greatly reduced the hydraulic gradient, and thus groundwater flow, through Tito Park.

3.2 CENTRAL PLANT AREA

The central plant area covers the majority of the former plant site including the acid plant, speiss-dross plant, and the majority of the slag pile (Figure 5). Primary water level monitoring sites in this area are listed in Table 2 with hydrographs for select sites shown in Figure 7. Water level declines between 10/31/11 and 9/13/12 in this area ranged from 5.48 feet at well EH-204 (west of the Lower Ore Storage area), to 0.42 feet at DH-68 (south end of slag pile). Significant water level declines were also recorded at well DH-71 (3.78 feet) located between the acid plant and lower ore storage area, DH-2 (3.62 feet), completed in tertiary sediments west of the plant site, and DH-42 (3.55 feet) completed in the former acid plant area. Generally, water level declines are greatest on the west side of the plant site compared to the east side (beneath the slag pile). In fact, the water level at slag pile well DH-68 showed virtually no response to the Upper Lake or Prickly Pear Creek drawdown (Figure 7). Likewise, water levels at well DH-4, also located on the east side of the plant and only a few tens of feet north of Lower Lake, has also shown minimal response to the Upper Lake dewatering although DH-4 did show some response to the creek lowering phase of the test (Figure 7). The general lack of water level response at DH-4 and DH-68 suggests limited hydraulic interaction between the south plant groundwater system and the east side of the plant site. The lack of hydraulic continuity to the north of Lower Lake has previously been noted by the steep hydraulic gradients mapped in this area. These results suggest that the SPHC may have a lesser impact on groundwater levels beneath the east portion of the site (beneath the slag pile) as compared to the south and west portions of the plant site.

Groundwater levels in the former acid plant area (DH-19R and DH-42, Figure 7) have declined about 3.5 feet as of 9/13/12 and continue to decline to date. Post-SPHC groundwater levels in this area are of particular interest since the former acid plant contains some of the highest subsurface soil contaminant concentrations on the site.

3.3 NORTH PLANT AREA

North zone wells are shown on Figure 5 and listed in Table 2. Hydrographs for select wells are shown in Figure 8. Groundwater levels in the northern portion of the plant site show a steady decline from prior to the onset of the Upper Lake drawdown through mid-September 2012, although water levels at all sites increased temporarily in June in response to spring runoff. Overall water level declines in this area range from 3.30 feet at wells DH-6/15 near Prickly Pear Creek, to 5.55 feet at DH-49 in the northwest corner of the site.

Besides being some of the largest water level declines recorded during the lake drawdown test, the 2012 north plant site water level trends are notable in their contrast from previous years. Figure 9 shows long-term water level trends at north plant site wells DH-66 and DH-17. Water levels in these wells, and throughout the northwest portion of the site, have historically been lowest in winter and spring, and highest during late summer and fall. In contrast, water levels on the east side of the plant site are typically highest in spring and early summer, consistent with Prickly Pear Creek water levels. Continuous water level hydrographs from several wells located immediately north and west of the plant site, including EH-205/210, SP-4, EH-60/61/103 (Figure 5), show a definite correlation in groundwater levels and the presence or absence of flow in Wilson Ditch (Figure 10). Therefore, the lack of a late summer water level rise in in the northwest plant site wells in 2012 is attributable to the lack of flow in Wilson Ditch. Thus, in evaluating results of the Upper Lake drawdown test and ramifications of the SPHC, the effects of lake removal and creek lowering as well as possible elimination of flow in Wilson Ditch must be taken into account.

One other potential influence on the 2012 water level trends and drawdown test results is the lack of precipitation during summer 2012. The lack of precipitation has undoubtedly had some influence on groundwater levels, along with dewatering of Upper Lake and Wilson Ditch. To assess the possibility that climatic conditions are a primary cause of the significant water level declines in the northwest plant site, long-term water levels from north plant site well DH-66 were plotted against corresponding water levels from County monitoring well "Airport N-N" located north of the plant site near the Helena Airport. The Airport N-N well is located near the Helena Valley irrigation canal and historically has exhibited similar summer season water level increases as the northwest plant site wells. As shown in Figure 11, 2012 water level trends at the Airport N-N well exhibit the same summer season increase as seen in previous years, while the DH-66 trend does not. The consistent trends at Airport N-N in 2012 suggest that climatic conditions have not significantly affected seasonal trends at this well, and climatic conditions most likely are not responsible for the lack of late summer water level increases in DH-66 and other northwest plant site wells. Thus, the Upper Lake drawdown and lack of flow in Wilson Ditch are the most likely causes of the significantly lower northwest plant site groundwater levels in 2012.

Groundwater levels in the north plant site showed no apparent response to lowering of Prickly Pear Creek above the smelter dam, although they do correlate closely with creek levels downstream of the dam. Wells DH-6/DH-15 exhibit a strong correlation with the Prickly Pear Creek water level due to their proximity to the creek. As shown in Figure 8, all the north area wells correlate fairly well with DH-6/15. For example, an increase in the creek level during January 2012 due to an ice jam just upstream of Highway 12 caused water levels to rise about one foot in DH-6/15, with a similar although more subdued response apparent in all the north plant site wells. The groundwater level response to spring runoff (June) is also apparent in the north plant site hydrographs. This information shows the close interaction of the north plant site groundwater with the segment of Prickly Pear Creek downstream of the Smelter Dam.

Figure 12 shows the magnitude of measured water level declines as of 9/13/12 throughout the plant site. As presented above, water level declines have been greatest (4 to 5 feet) in the south plant site (due to the proximity to Upper Lake), and in the north plant site (up to 6 feet) due in part to the lack of flow in Wilson Ditch. Water level declines in the 3 to 4-foot range extend from Lower Lake and Tito Park on the east, westward through the acid plant area and west of the plant site. Conversely, measured water level declines are less than one foot in the east plant site beneath the slag pile. With the possible exception of the north plant site, the water level patterns shown on Figure 12 highlight those areas most sensitive to the Upper Lake drawdown. These areas, namely the south and west portions of the plant site, are expected to show the greatest response in water level drawdown from the SPHC. Water level declines will also be greatest in the northwest portion of the site if recharge from Wilson Ditch is eliminated through the SPHC. The water level declines plotted on Figure 12 reflect the net change in water levels between 10/31/11 and 9/13/12. As such, effects of lowering Prickly Pear Creek at the smelter dam, which ended on 2/24/12, are not reflected in Figure 12. If the creek had remained at the lowered stage, measured water declines would have been greater than the currently measured levels.

4.0 EVALUATION OF TEST RESULTS

The drawdown test data collected to date has undergone a preliminary evaluation with respect to insights into the plant site groundwater system and implications for the SPHC activities. Projections of plant site groundwater levels under permanent lake dewatering and Prickly Pear Creek relocation/lowering as proposed under the SPHC program have been made, and possible effects on groundwater flow rates and patterns through the plant site assessed.

4.1 PROJECTED WATER LEVELS

Relocation and lowering of Prickly Pear Creek through removal of the smelter dam is a key component of the SPHC and will have significant impacts on south plant site groundwater levels. Although the creek lowering phase of the Upper Lake drawdown test lasted for only about two months (from 12/20/11 through 2/24/12), information obtained during that period provided insight into the combined effects of lake dewatering and creek lowering on groundwater levels. Figure 13 shows the south plant site hydrographs along with the Prickly Pear Creek stage at the smelter dam from 12/20/11 (start of creek lowering) through 7/24/12. During the latter half of the creek lowering phase (1/30/12 through 2/20/12), the creek level was maintained at a relatively steady elevation of about 3911 feet. Water levels at well APSD-8, located between the creek and Lower Lake, stabilized around 3913 feet during this period, or about 2 feet higher than the creek. Based on this relationship, it can be assumed that the APSD-8 water level will stabilize about 2 feet higher than the post-SPHC creek level of 3906 feet at the current dam location, or at about 3908 feet. In actuality, the APSD-8 water level may stabilize less than 2 feet above the creek level since the 2-foot difference recorded during the drawdown test was most likely affected by water levels in adjacent Lower Lake. With elimination of Lower Lake, water levels at APSD-8 will most likely stabilize less than 2 feet above the creek level. Therefore, the groundwater level at APSD-8 is estimated to be between 3906 and 3908 feet following lake dewatering and permanent creek lowering.

After raising the creek level back to normal dam operating levels (about 3915.5 feet), water levels in Lower Lake and the Tito Park wells continued to decline in response to the Upper Lake drawdown. As of July 2012, groundwater levels in the Tito Park area had all fallen to within 0.5 feet of the creek level (Figure 13). Therefore, with long-term elimination of groundwater recharge from Upper and Lower Lake, groundwater levels throughout the Tito Park area are expected to stabilize close to or slightly higher than the final Prickly Pear Creek water level. Projected overall post-SPHC water level declines are shown for select sites on Figure 12.

Figures 14 and 15 show two east-west schematic cross sections through the south plant area. Both cross sections show the site stratigraphy, the pre-drawdown test (10/31/11) groundwater levels, the 7/24/12 groundwater levels, and the range of projected post-SPHC groundwater levels. Figure 14 also shows total arsenic and selenium (where available) soil concentrations with depth. As shown on Figure 14 (and discussed above), groundwater levels to date have declined on the order of five feet from Upper Lake dewatering alone, with an additional five feet of decline expected from permanent lowering of the creek. The water level declines measured to date have already lowered the groundwater table below the zone of highest soil contaminant concentrations, and achieving the final projected groundwater levels would further dewater the contaminated soils. The Figure 15 cross section lies slightly north of Figure 14 and includes Lower Lake (note that cross section traces for Figures 14 through 17 are shown on an inset map on Figure 14). Following the Prickly Pear Creek relocation and lowering, groundwater levels are expected to stabilize near the bottom of Lower Lake.

It is important to note that the projected post-SPHC water levels in the south plant area are based on preliminary post-SPHC creek channel locations and elevations upstream of the current dam location. If final creek elevations or locations change appreciably from the preliminary plans, the post-SPHC groundwater levels may be affected. Also, water level drawdown in response to the temporary bypass channel may be different from that estimated for the final creek relocation. The greater distance of the proposed bypass channel from the plant site, as compared to the final creek channel location, may reduce the observed level of groundwater drawdown on the plant site while the temporary bypass is in operation.

Figure 16 shows similar information along a cross section extending from Upper Lake northwestward through the west side of the plant and the former acid plant. As expected, projected post-SPHC water level declines will be greatest in the south plant area and are expected to decrease overall to the north. Water level declines as of 9/13/12 have already dewatered some of the most highly contaminated soils in the acid plant area (see abandoned well DH-19, Figure 16), with additional water level declines expected in this area. As mentioned in the previous section, post-SPHC water levels in the northwest plant site will depend on the presence or absence of flow in Wilson Ditch in the future.

Figure 17 includes a cross section extending due north from Upper Lake through Lower Lake and the slag pile. In contrast to the significant drawdown projected in the south plant area, this figure also shows the lack of measured and projected groundwater drawdown on the east plant site beneath the slag pile. Also of note is the very steep hydraulic gradient between Lower Lake and well DH-4 to the immediate north. As previously mentioned, a zone of low permeability material is believed to be present in this area restricting northward flow from Lower Lake towards DH-4.

It should be noted that the projected water levels through the west side of the plant site and through the acid plant do not take into account potential effects of a low permeability zone or cutoff wall around the south plant area as proposed in the SPHC plans. Placement of a cutoff wall downgradient of the south plant could further reduce groundwater flow rates and water levels in the acid plant area depending on the system design, and on the magnitude of groundwater underflow from the Upper Lake area towards the plant site.

4.2 EFFECTS ON GROUNDWATER FLOW PATTERNS

In addition to changes in groundwater levels, potential alterations in groundwater flow patterns and rates have been evaluated from the preliminary drawdown test data. Figures 18 and 19 present the plant site groundwater potentiometric surface for October 2010 and July 24, 2012, respectively. Although the two maps show a similar overall pattern to the potentiometric surface, a few key differences are apparent. As expected, the most obvious differences occur in the south plant site. For instance, the 3920 foot potentiometric contour on the October 2010 map extends northward around the north shoreline of Upper Lake with the Upper Lake water level at 3920.6 feet (Figure 18). In July 2012 (Figure 19) the 3920 contour is located approximately 1700 feet further south. This change alone has resulted in a significant decrease in the hydraulic gradient through Tito Park and an apparent corresponding decrease in the groundwater flux.

Although much less dramatic, the potentiometric contours on the west plant site have also shifted southward from October 2010 to July 2012 due to the water level declines documented in this area. This pattern is evident in the 3900 and 3905 potentiometric contours. Although subtle, these patterns do reflect real changes in the acid plant area groundwater levels. Also of note is the lack of change in the potentiometric surface in the eastern portion of the plant site beneath the slag pile. This is consistent with previous observations suggesting relatively little change in groundwater levels in this area in response to the lake dewatering and creek lowering.

It should be noted that the July 2012 potentiometric surface only reflects the effects of partial dewatering of Upper Lake, and does not account for future creek lowering and placement of a low permeability zone downgradient of the south plant area. These components of the SPHC program will result in significant differences in the post-SPHC potentiometric surface as compared to the July 2012 surface. As previously noted, groundwater levels in the south plant area are expected to closely approximate the final creek levels following permanent lowering of the creek. This will effectively eliminate the northward “bulge” in the potentiometric surface caused by Upper and Lower Lake and the elevated creek level behind the smelter dam.

Another possible effect of the SPHC on plant site groundwater flow patterns is a more westward component of groundwater flow through the northern portion of the plant site. Currently, groundwater flows in a northwesterly direction beneath the slag pile and northwest portion of the site. With little impact expected for water levels in the eastern portion of the site and additional drawdown expected for the western portion of the site, groundwater flow in the north plant area may assume a more westerly orientation. Indications of an increased gradient towards the west can already be seen in the current drawdown test results. As shown on Figure 7, water level declines on the west plant site (see well DH-42, Figure 7), and the lack of response in well DH-68 located on the south portion of the slag pile, have resulted in a reversal in hydraulic gradients between these areas.

A third possible effect of the SPHC is a decrease in apparent westward flow from the south plant area towards the Phase I CAMU. Drawdown test water level trends at CAMU wells

MW-6, MW-2 and MW-3 correlate closely with those at south plant site monitoring well DH-20, while other CAMU wells (with the possible exception of MW-10) show no correlation. Figure 20 shows this relationship for select CAMU wells. Lowering the south plant groundwater levels should reduce or possibly eliminate potential westward flow in this area, depending on the post-SPHC groundwater levels on the south plant site.

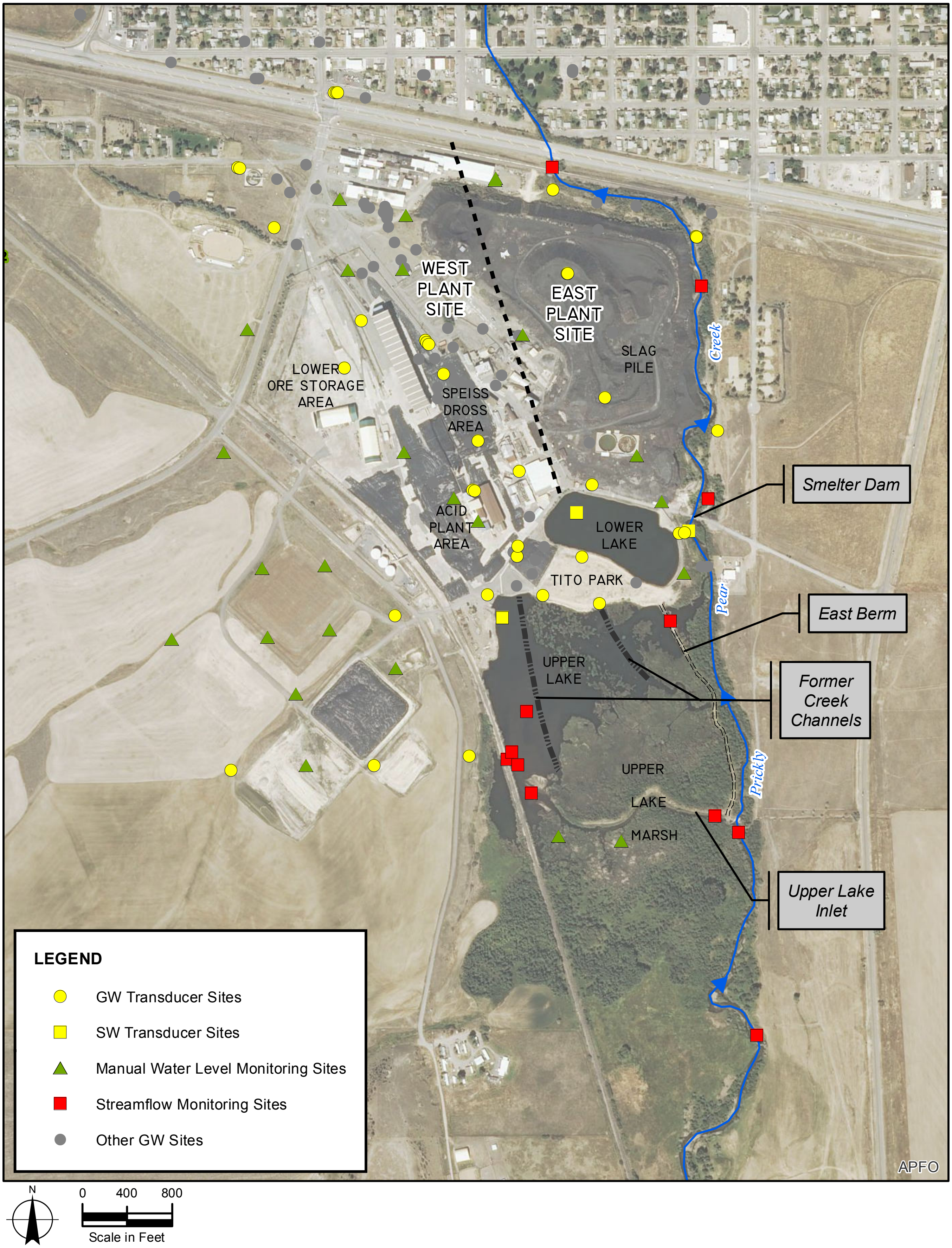
5.0 SUMMARY AND RECOMMENDATIONS

The Upper Lake drawdown test results to date show groundwater levels have declined on the order of 3 to 5 feet in the south, west and northwest plant areas, and less than a foot on the east side of the plant beneath the slag pile. As of mid-September, water levels continue to decline across the site. Water level declines of an additional five feet or more are expected in the south plant area in response to dewatering of Upper Lake and permanent lowering of Prickly Pear Creek under the SPHC project. The groundwater level declines already realized through the lake drawdown test have dropped the water table below the zone of highest soil contaminant levels in certain areas, with post-SPHC water level drawdown expected to further dewater contaminated soils in the south plant and acid plant areas. Lowering of the water table is not only expected to reduce contact between the plant site groundwater and soil contaminants, but should also reduce the rate of groundwater flow, or flux, through the plant site. Together, these two factors should result in a reduction of contaminant leaching to groundwater and contaminant loads, in pounds per day, emanating from the plant site.

Dewatering of Upper Lake/Lower Lake and lowering the Prickly Pear Creek level by approximately 8 feet at the current smelter dam location as proposed under the SPHC project will result in a more uniform potentiometric surface through the south plant area and eliminate the northward “bulge” in the potentiometric surface caused by Upper and Lower Lake. The result will be a reduction in seepage from the northwest portion of Upper Lake to the west plant site, and a reduction in seepage from the east and west ends of Lower Lake which currently provides recharge to Prickly Pear Creek and the west plant site, respectively. Other potential changes in the plant site groundwater flow patterns include an increased westerly component to groundwater flow in the northern portion of the site (due to greater effect on groundwater levels in the west plant area than the east), and a reduction in potential westward flow from the south plant site towards the Phase I CAMU cell. Effects on northwest plant site groundwater levels will depend in large part on future flow conditions in Wilson Ditch.

One outstanding question related to the Upper Lake drawdown test is the volume and fate of groundwater underflow beneath Upper Lake onto the plant site. The rate of groundwater underflow from beneath Upper Lake towards the plant site should be evaluated further to determine how this source may affect post-SPHC groundwater flow through the plant site. Depending on the results, appropriate measures could be incorporated into design of the low permeability zone/groundwater cutoff wall proposed in the SPHC to further reduce groundwater flow through the plant site, if necessary. Gaining a better understanding of this groundwater underflow component will also prove useful in assessing construction dewatering requirements for the SPHC.

Based on the findings to date, continuation of the pumping phase of the Upper Lake drawdown test through September 2012 is recommended. Continuing the test through September will provide a full year of drawdown test data, which will aid in discerning seasonal (and longer-term) water level trends from lake drawdown-induced effects. With cessation of pumping, the Upper Lake water level should recover from the current 3916 level to about 3918 feet. Plant site groundwater levels should be recorded during the lake recovery period to provide additional information on the groundwater response to lake dewatering. Groundwater level trends recorded during both the lake drawdown and recovery phase of the test will help delineate possible areas of increased permeability, preferential groundwater flow paths, and post-SPHC hydraulic gradients and groundwater fluxes through the site. Information presented in this memorandum can be updated following the water level recovery phase of the test. Based on information collected to date however, the Upper Lake drawdown test results indicate that the SPHC project will effectively lower plant site groundwater levels, thus reducing potential leaching of contaminants from soils to groundwater, and will most likely reduce overall groundwater flow rates through the plant site.



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PRIMARY SITE FEATURES
FOR UPPER LAKE DRAWDOWN TEST
EAST HELENA FACILITY

FIGURE
1

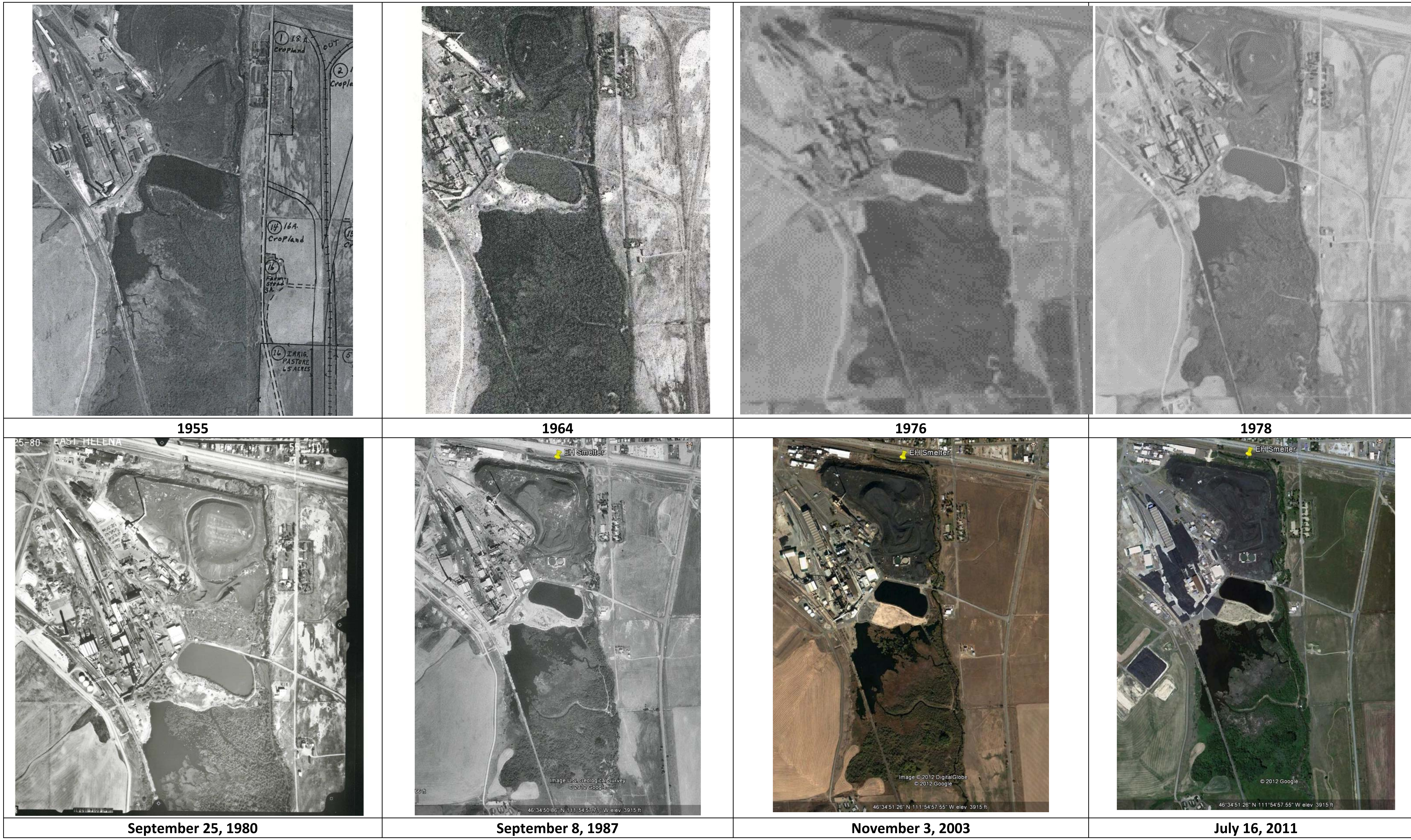
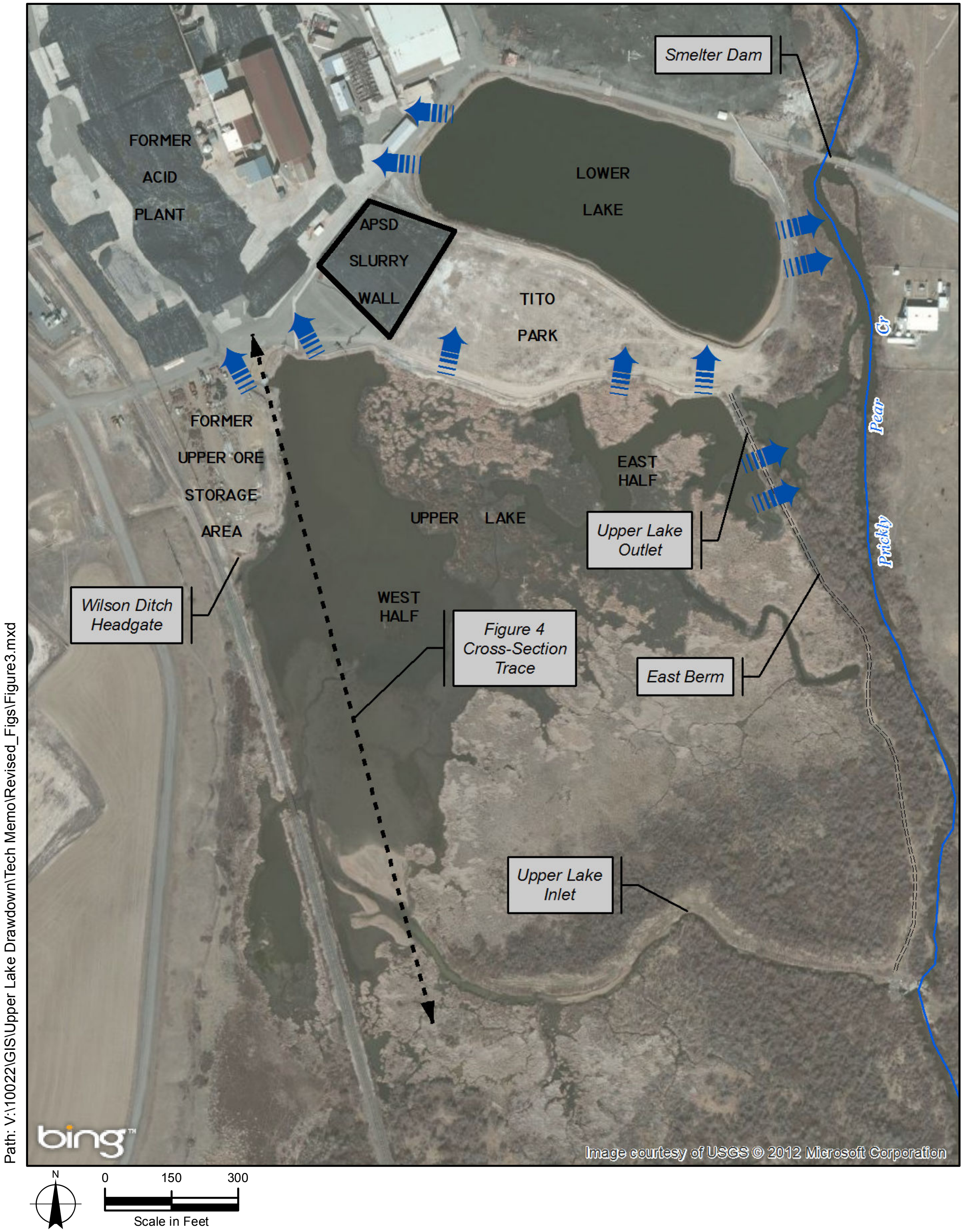


FIGURE 2. PROGRESSION OF UPPER LAKE EXPANSION SINCE 1955.



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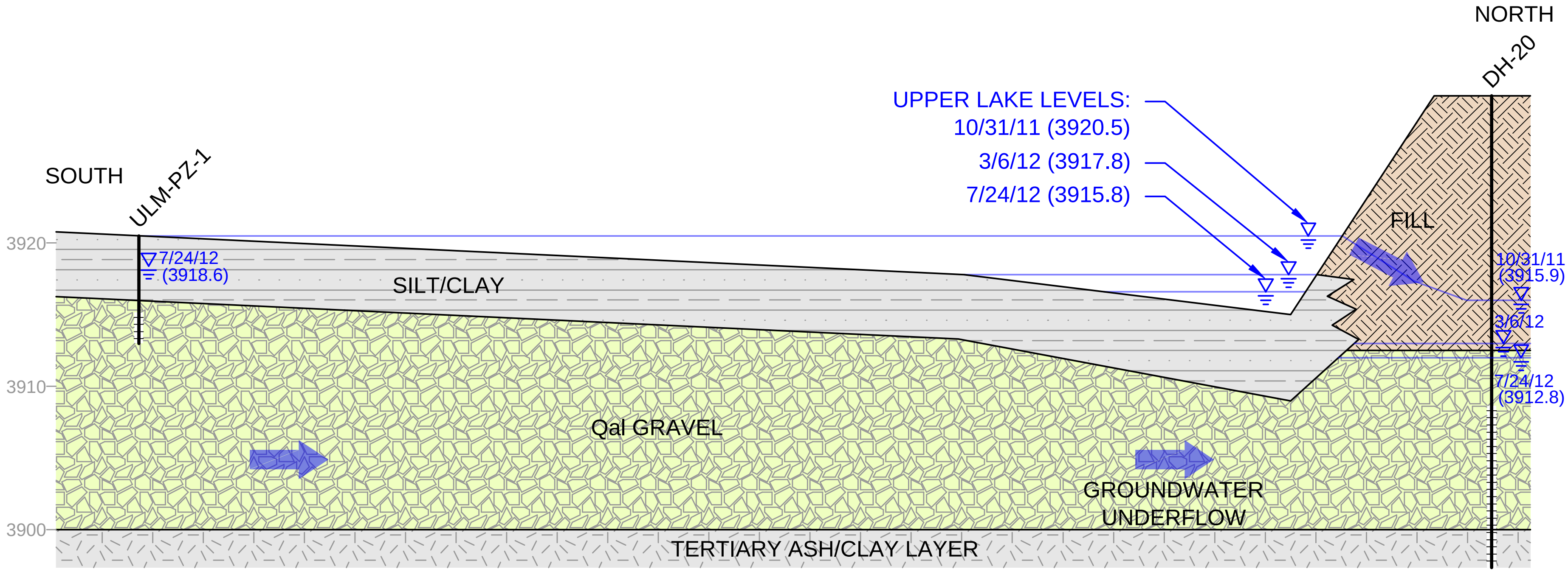
**PRIMARY UPPER (AND LOWER) LAKE LEAKAGE PATHWAYS
AT MAXIMUM LAKE LEVELS
EAST HELENA FACILITY**

FIGURE
3



LEGEND

FILL

SILT/CLAY

GRAVEL/COBBLE

ASH/CLAY

GROUNDWATER FLOW DIRECTION

HORIZONTAL SCALE 1"=200'

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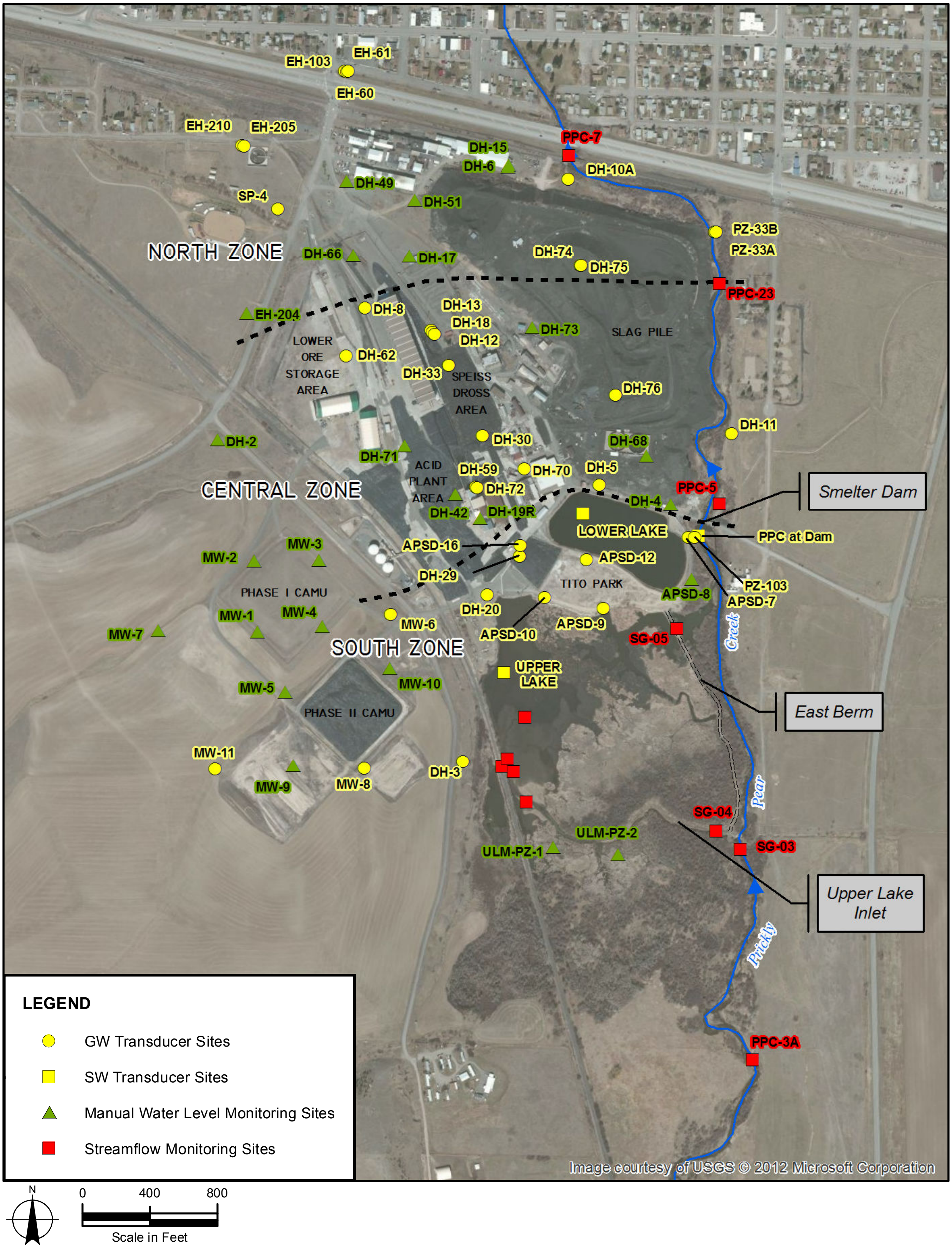
SCHEMATIC CROSS SECTION THROUGH UPPER LAKE - WEST HALF

FIGURE **4**



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WATER LEVEL MONITORING SITES FOR UPPER LAKE DRAWDOWN TEST EAST HELENA FACILITY

FIGURE

5

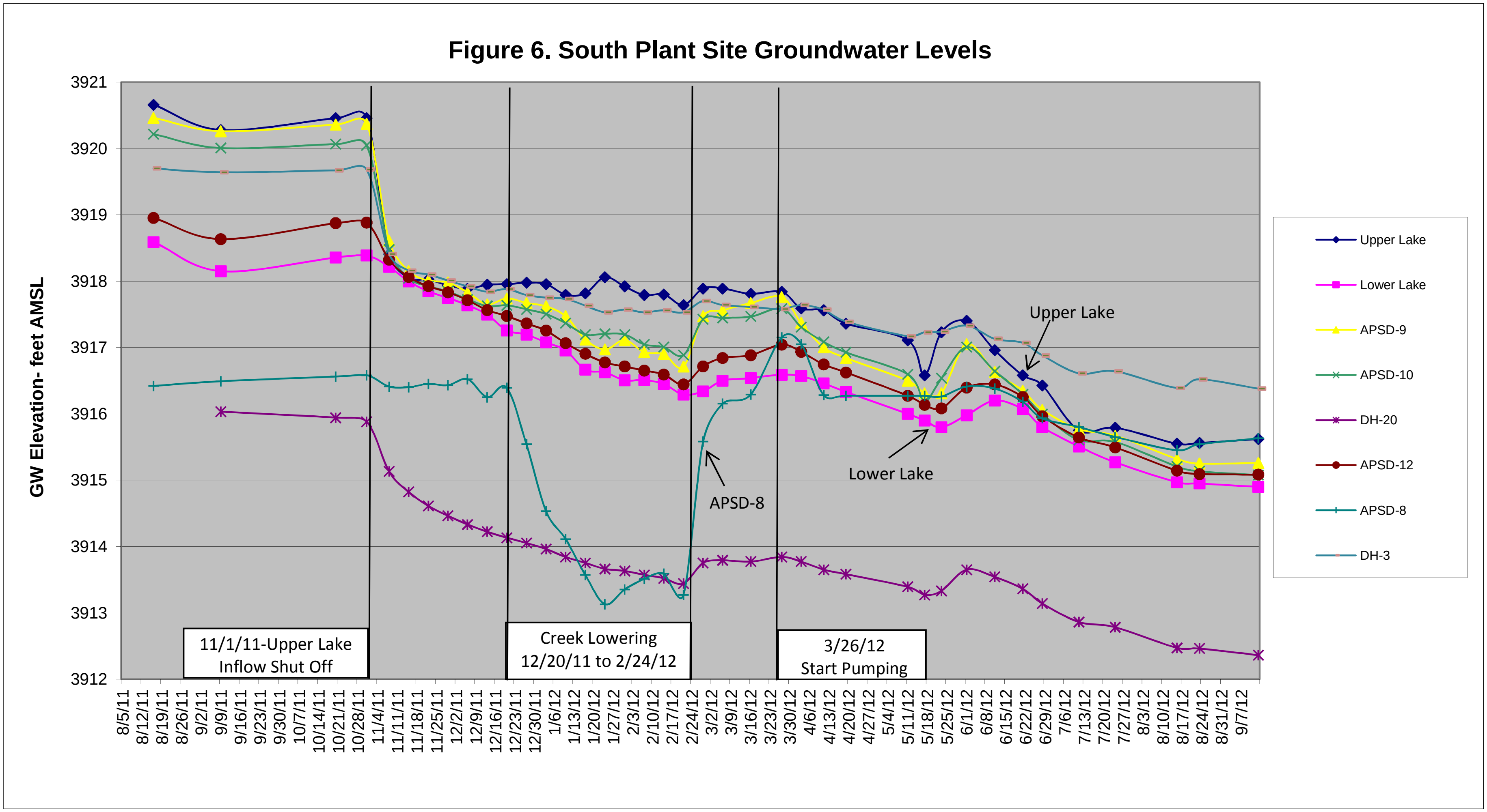

Figure 6. South Plant Site Groundwater Levels
GW Elevation- feet AMSL
3921
3920
3919
3918
3917
3916
3915
3914
3913
3912
11/1/11-Upper Lake
Inflow Shut Off
Creek Lowering
12/20/11 to 2/24/12
3/26/12
Start Pumping
Upper Lake
Lower Lake
APSD-8
8/5/11
8/12/11
8/19/11
8/26/11
9/2/11
9/9/11
9/16/11
9/23/11
9/30/11
10/7/11
10/14/11
10/21/11
10/28/11
11/4/11
11/11/11
11/18/11
11/25/11
12/2/11
12/9/11
12/16/11
12/23/11
12/30/11
1/6/12
1/13/12
1/20/12
1/27/12
2/3/12
2/10/12
2/17/12
2/24/12
3/2/12
3/9/12
3/16/12
3/23/12
3/30/12
4/6/12
4/13/12
4/20/12
4/27/12
5/4/12
5/11/12
5/18/12
5/25/12
6/1/12
6/8/12
6/15/12
6/22/12
6/29/12
7/6/12
7/13/12
7/20/12
7/27/12
8/3/12
8/10/12
8/17/12
8/24/12
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Upper Lake
Lower Lake
APSD-9
APSD-10
DH-20
APSD-12
APSD-8
DH-3

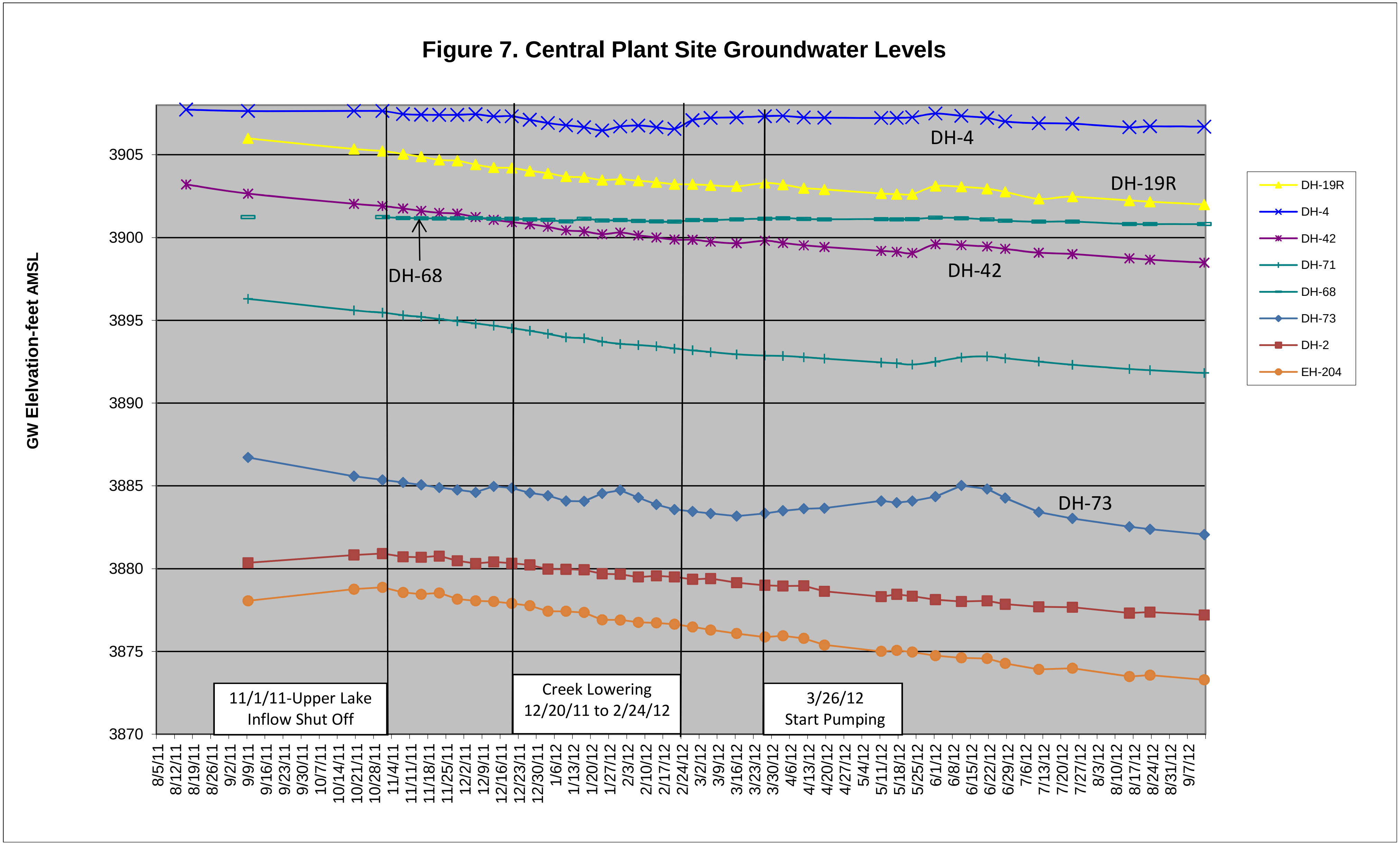


Figure 7. Central Plant Site Groundwater Levels
GW Elevation-feet AMSL
DH-4
DH-19R
DH-68
DH-42
DH-73
11/1/11-Upper Lake
Inflow Shut Off
Creek Lowering
12/20/11 to 2/24/12
3/26/12
Start Pumping
DH-19R
DH-4
DH-42
DH-71
DH-68
DH-73
DH-2
EH-204

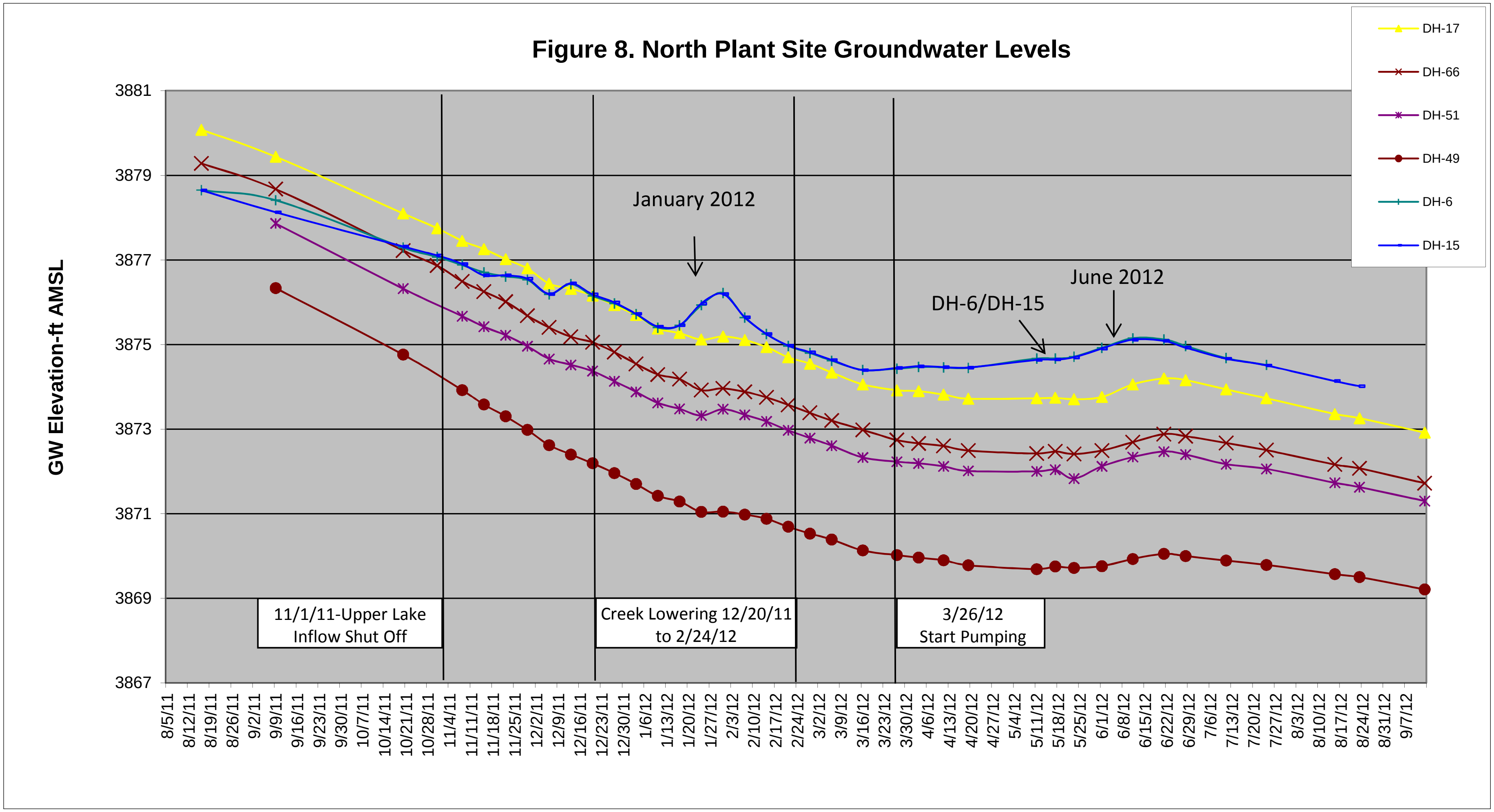


Figure 8. North Plant Site Groundwater Levels
GW Elevation-ft AMSL
3881
3879
3877
3875
3873
3871
3869
3867
January 2012
June 2012
DH-6/DH-15
11/1/11-Upper Lake Inflow Shut Off
Creek Lowering 12/20/11 to 2/24/12
3/26/12 Start Pumping
DH-17
DH-66
DH-51
DH-49
DH-6
DH-15
8/5/11
8/12/11
8/19/11
8/26/11
9/2/11
9/9/11
9/16/11
9/23/11
9/30/11
10/7/11
10/14/11
10/21/11
10/28/11
11/4/11
11/11/11
11/18/11
11/25/11
12/2/11
12/9/11
12/16/11
12/23/11
12/30/11
1/6/12
1/13/12
1/20/12
1/27/12
2/3/12
2/10/12
2/17/12
2/24/12
3/2/12
3/9/12
3/16/12
3/23/12
3/30/12
4/6/12
4/13/12
4/20/12
4/27/12
5/4/12
5/11/12
5/18/12
5/25/12
6/1/12
6/8/12
6/15/12
6/22/12
6/29/12
7/6/12
7/13/12
7/20/12
7/27/12
8/3/12
8/10/12
8/17/12
8/24/12
8/31/12
9/7/12

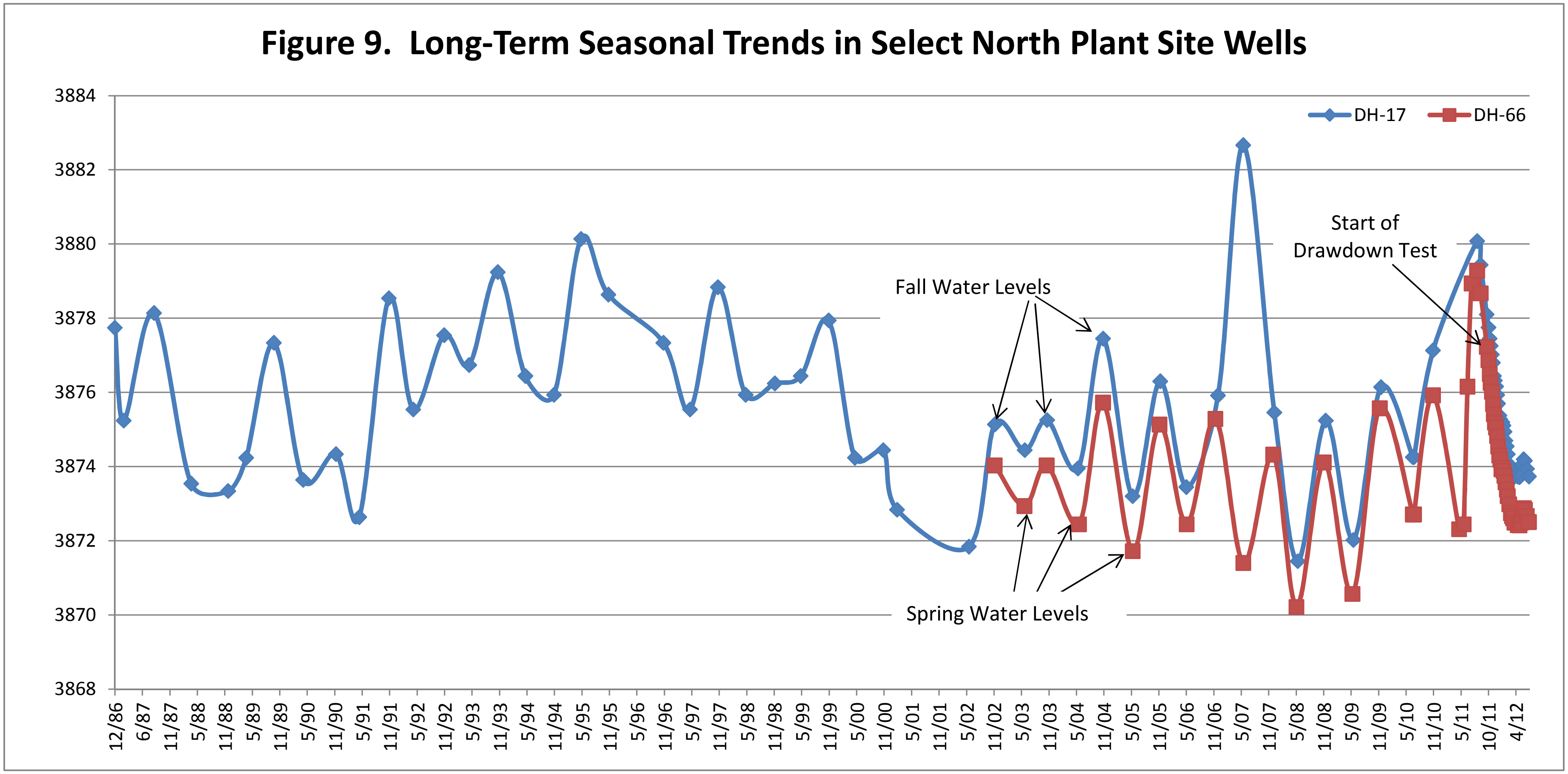
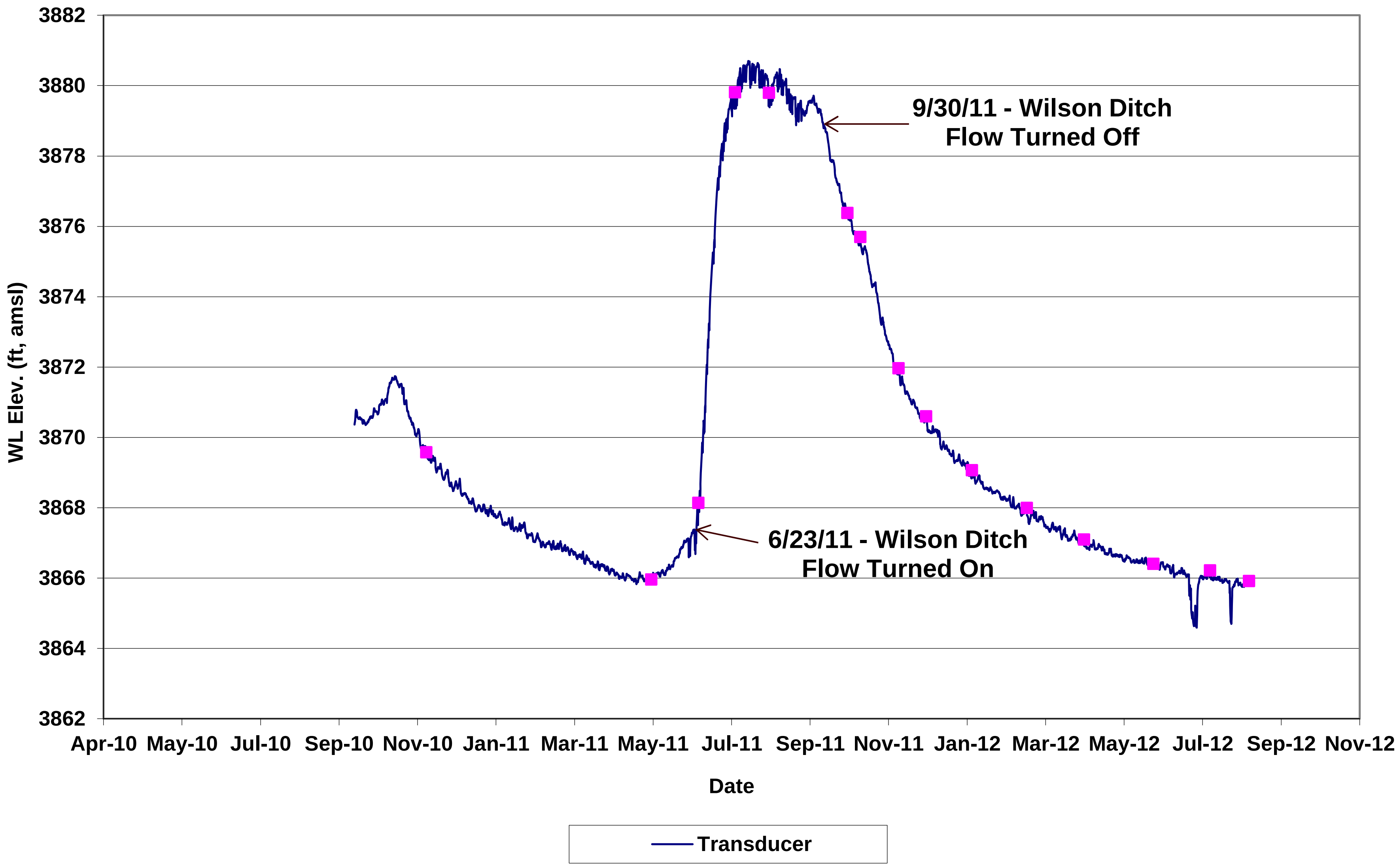


Figure 9. Long-Term Seasonal Trends in Select North Plant Site Wells
DH-17
DH-66
Start of Drawdown Test
Fall Water Levels
Spring Water Levels
3884
3882
3880
3878
3876
3874
3872
3870
3868
12/86
6/87
11/87
5/88
11/88
5/89
11/89
5/90
11/90
5/91
11/91
5/92
11/92
5/93
11/93
5/94
11/94
5/95
11/95
5/96
11/96
5/97
11/97
5/98
11/98
5/99
11/99
5/00
11/00
5/01
11/01
5/02
11/02
5/03
11/03
5/04
11/04
5/05
11/05
5/06
11/06
5/07
11/07
5/08
11/08
5/09
11/09
5/10
11/10
5/11
10/11
4/12

FIGURE 10. CONTINUOUS WATER LEVEL HYDROGRAPH FOR MONITORING WELL EH-210



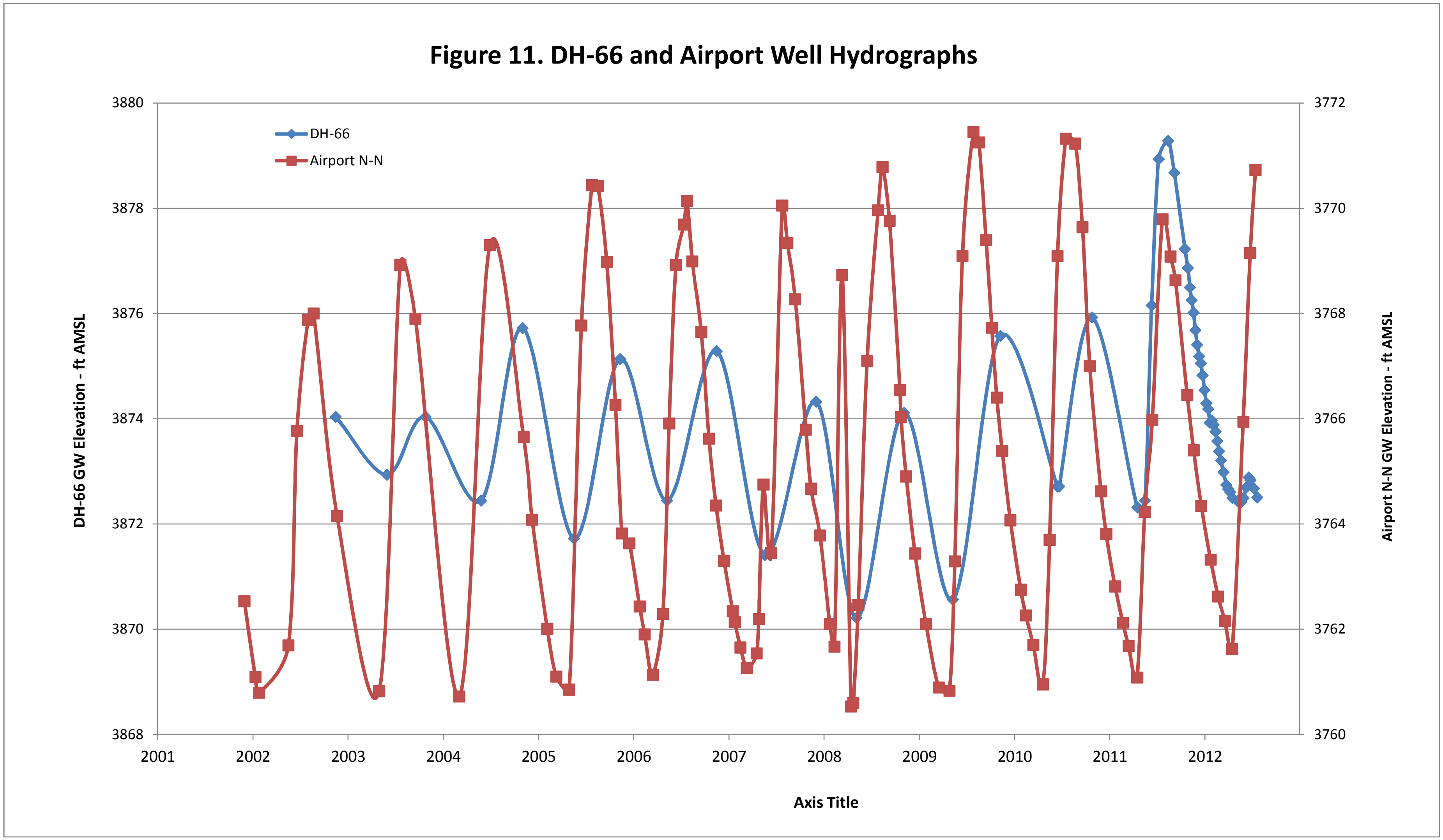
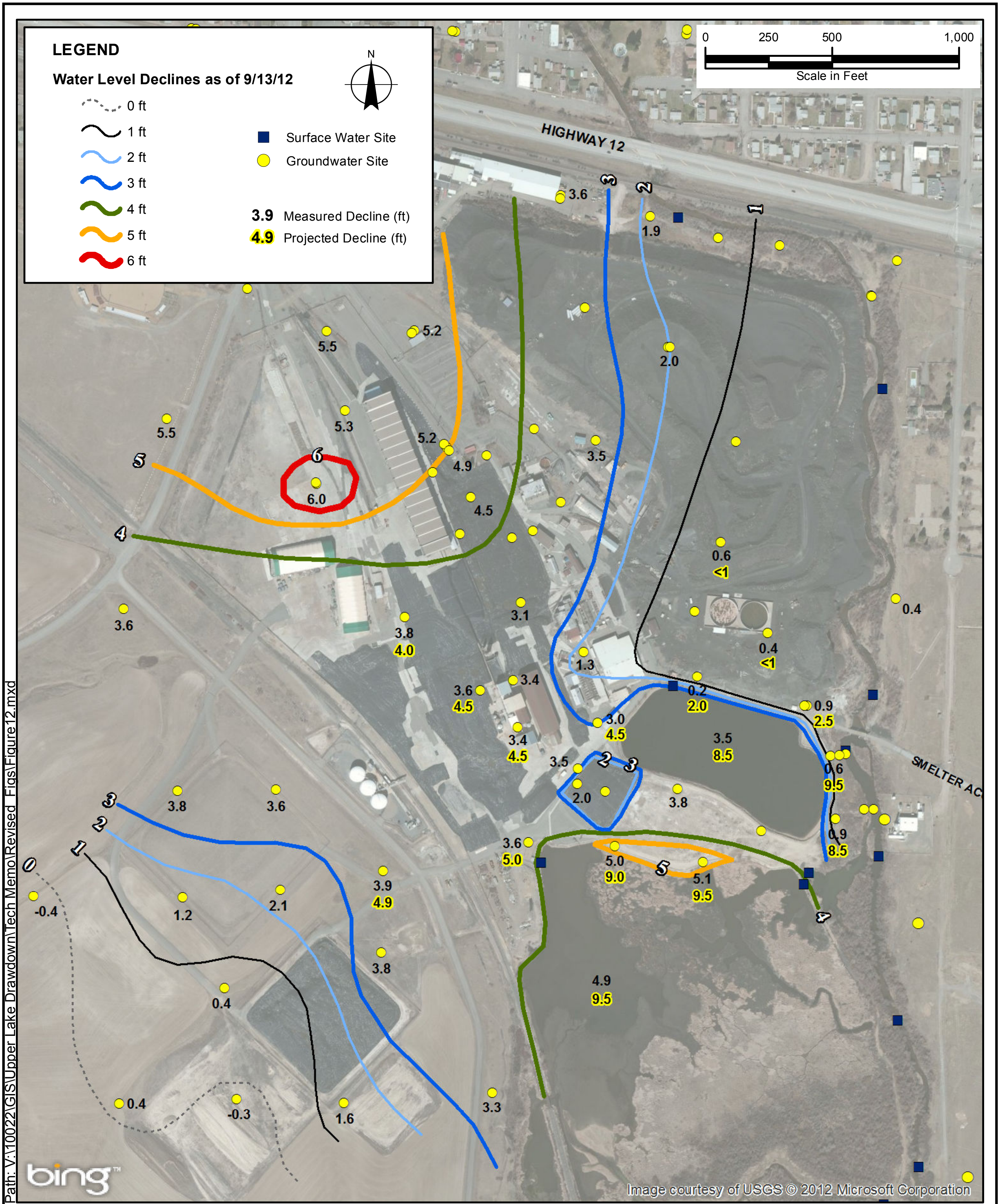


Figure 11. DH-66 and Airport Well Hydrographs
DH-66
Airport N-N
DH-66 GW Elevation - ft AMSL
Airport N-N GW Elevation - ft AMSL
Axis Title
3880
3878
3876
3874
3872
3870
3868
3772
3770
3768
3766
3764
3762
3760
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012



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**MEASURED WATER LEVEL DECLINES AS OF 9/13/12
AND PROJECTED DECLINES WITH
PERMANENT CREEK LOWERING AND UPPER LAKE REMOVAL
UPPER LAKE DRAWDOWN TEST - EAST HELENA FACILITY**

FIGURE
12

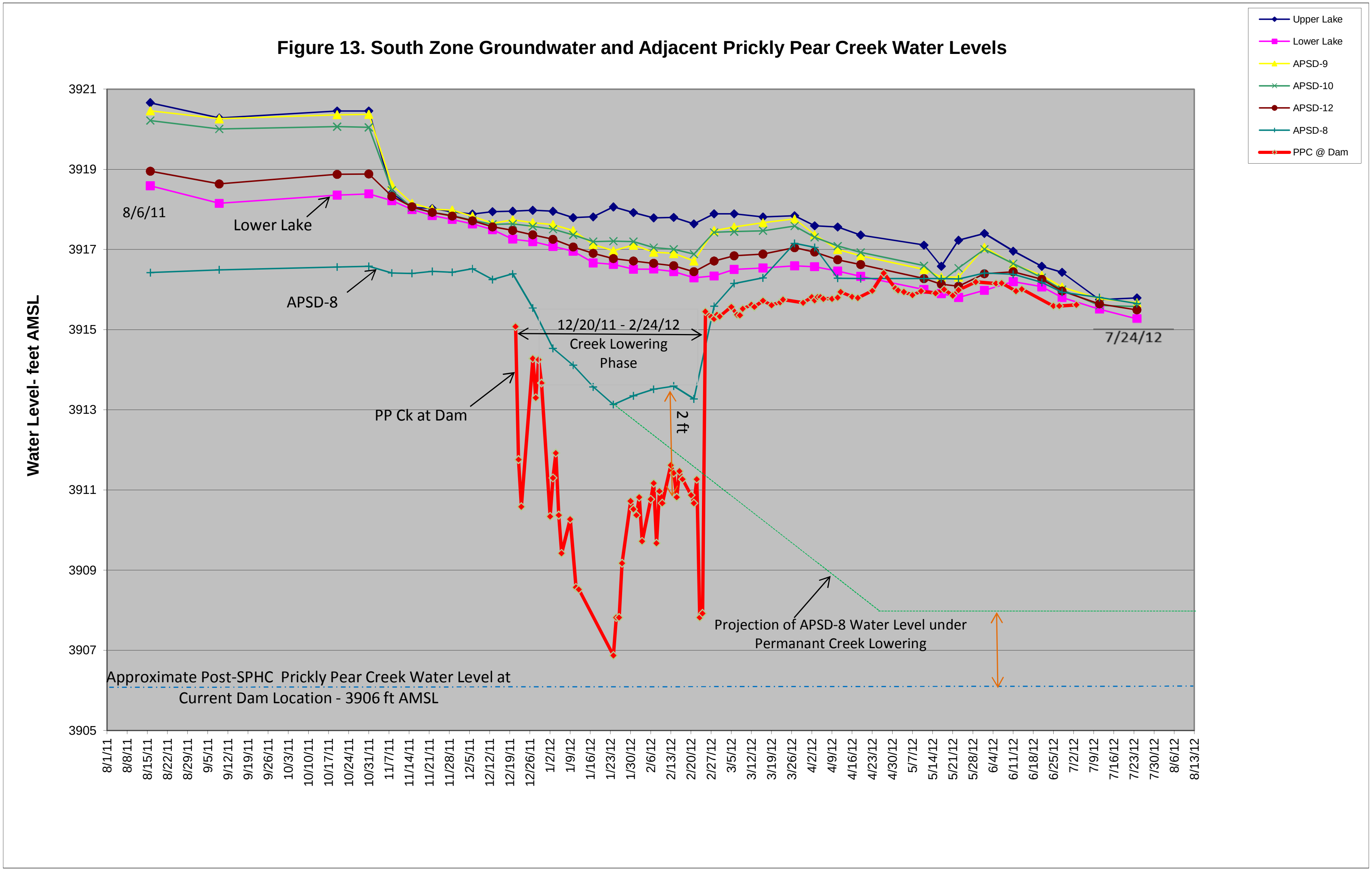


Figure 13. South Zone Groundwater and Adjacent Prickly Pear Creek Water Levels
Upper Lake
Lower Lake
APSD-9
APSD-10
APSD-12
APSD-8
PPC @ Dam
Water Level- feet AMSL
3921
3919
3917
3915
3913
3911
3909
3907
3905
8/6/11
Lower Lake
APSD-8
12/20/11 - 2/24/12
Creek Lowering
Phase
PP Ck at Dam
2 ft
7/24/12
Projection of APSD-8 Water Level under
Permanant Creek Lowering
Approximate Post-SPHC Prickly Pear Creek Water Level at
Current Dam Location - 3906 ft AMSL
8/1/11
8/8/11
8/15/11
8/22/11
8/29/11
9/5/11
9/12/11
9/19/11
9/26/11
10/3/11
10/10/11
10/17/11
10/24/11
10/31/11
11/7/11
11/14/11
11/21/11
11/28/11
12/5/11
12/12/11
12/19/11
12/26/11
1/2/12
1/9/12
1/16/12
1/23/12
1/30/12
2/6/12
2/13/12
2/20/12
2/27/12
3/5/12
3/12/12
3/19/12
3/26/12
4/2/12
4/9/12
4/16/12
4/23/12
4/30/12
5/7/12
5/14/12
5/21/12
5/28/12
6/4/12
6/11/12
6/18/12
6/25/12
7/2/12
7/9/12
7/16/12
7/23/12
7/30/12
8/6/12
8/13/12

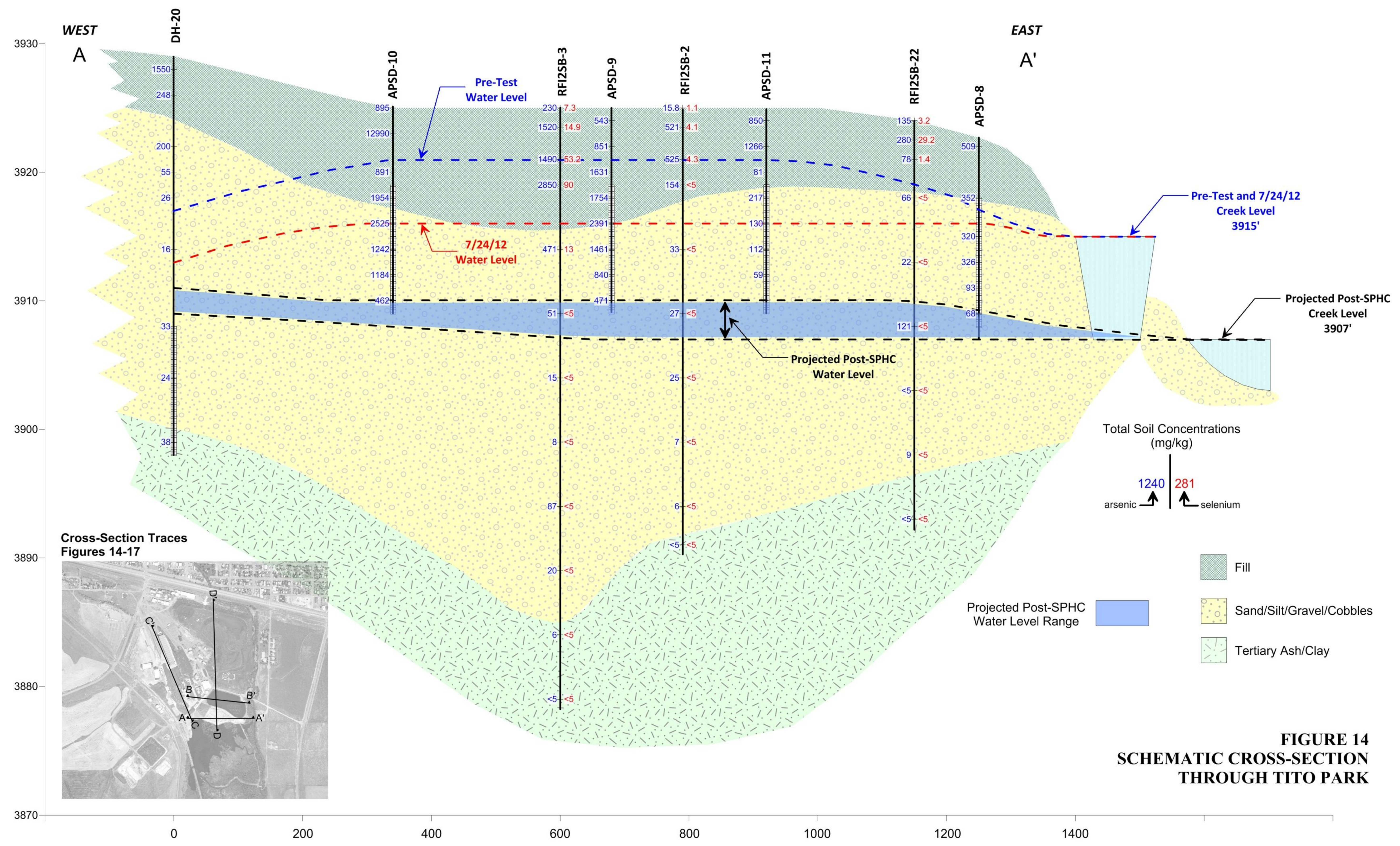


FIGURE 14
SCHEMATIC CROSS-SECTION
THROUGH TITO PARK

K:/PROJECT/12015/CSMs/Tito Park-UOS-LLake/tito_park_xsec.srf

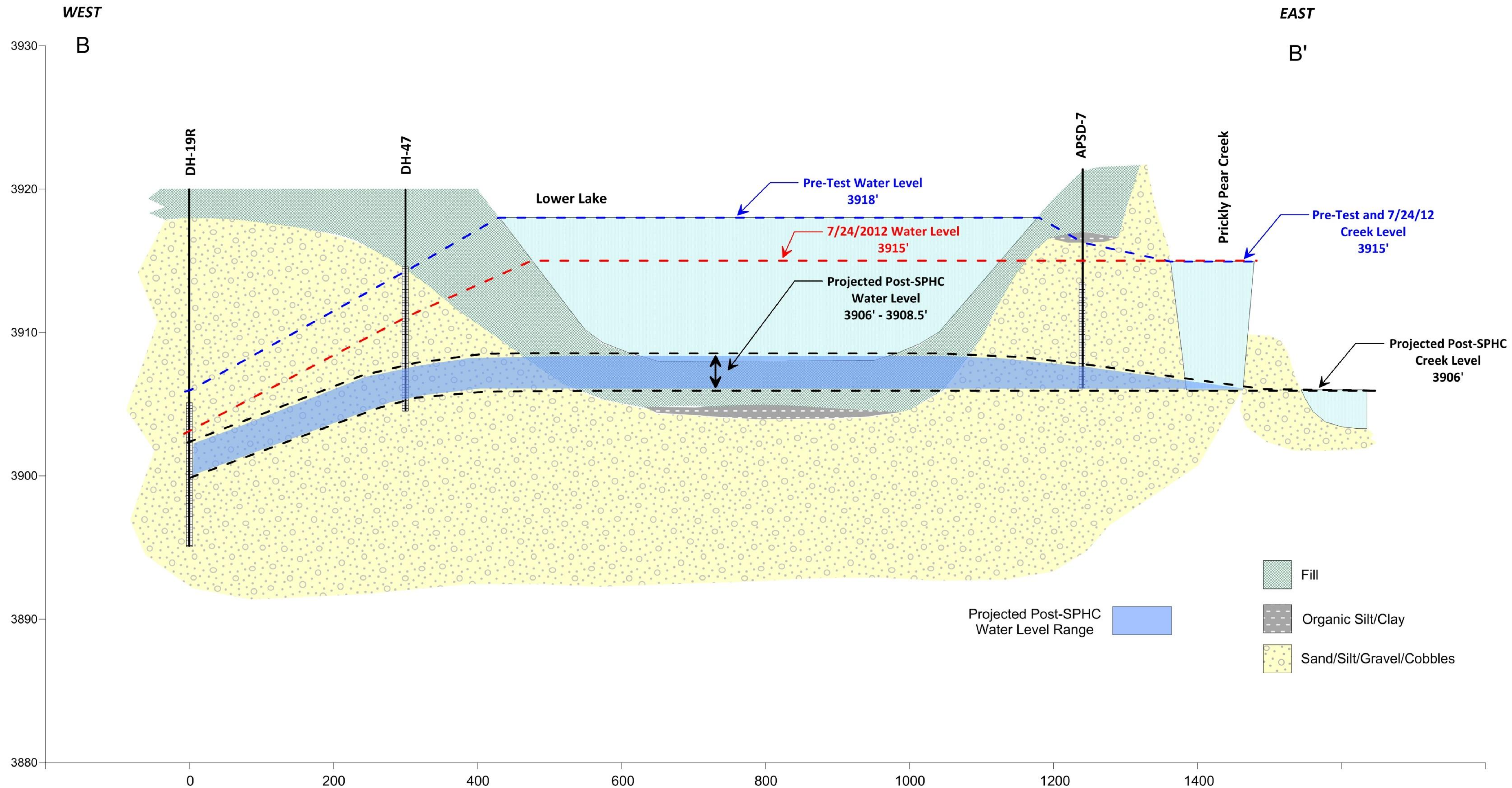
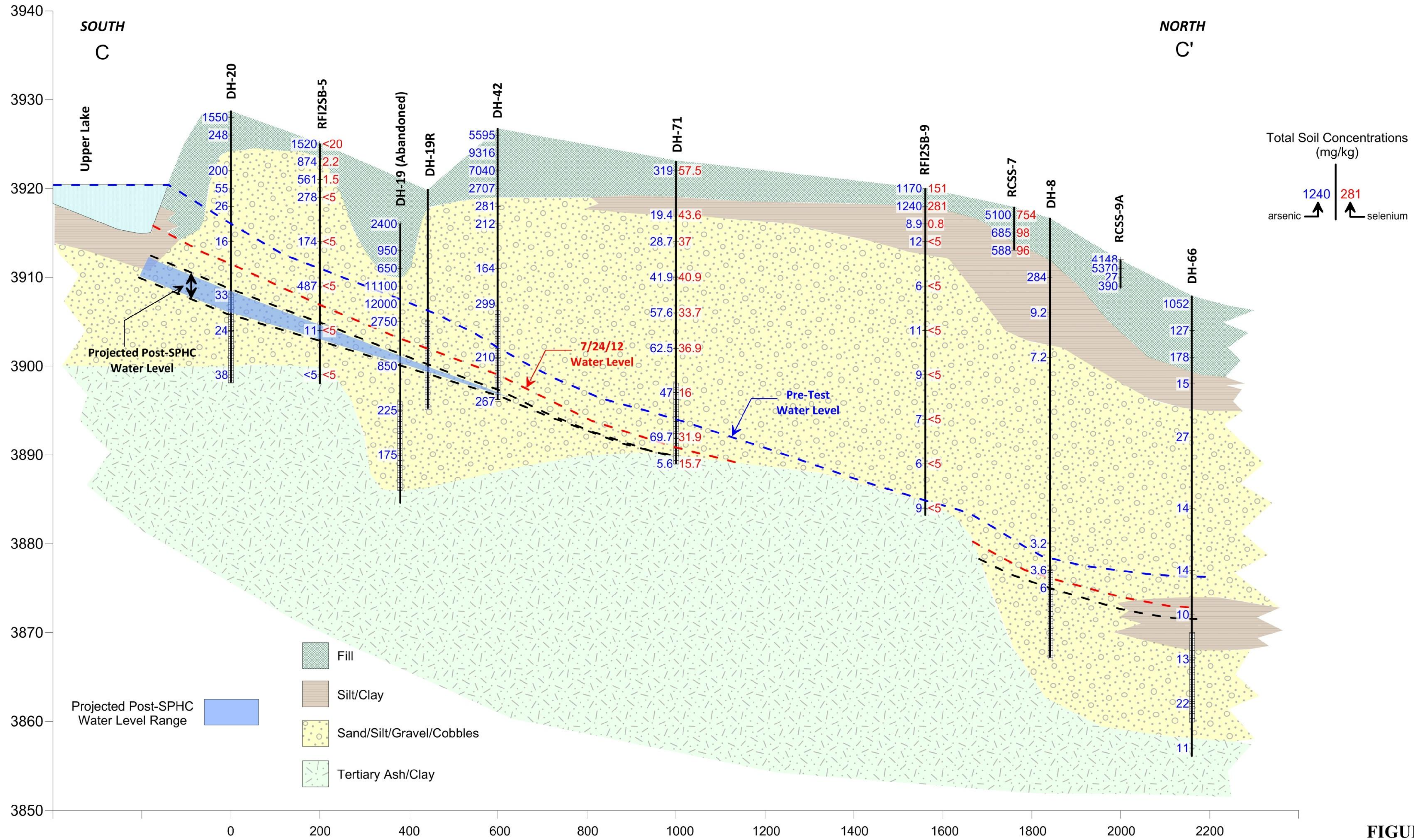


FIGURE 15
SCHEMATIC CROSS-SECTION THROUGH LOWER LAKE

K:/PROJECT/12015/CSMs/Tito Park-UOS-LLake/llake_xsec.srf



K:/PROJECT/12015/CSMs/Tito Park-UOS-LLake/ulake_northwest_xsec.srf

FIGURE 16
SCHEMATIC CROSS-SECTION
UPPER LAKE NORTHWEST
THROUGH WEST SE/LOSA AREA

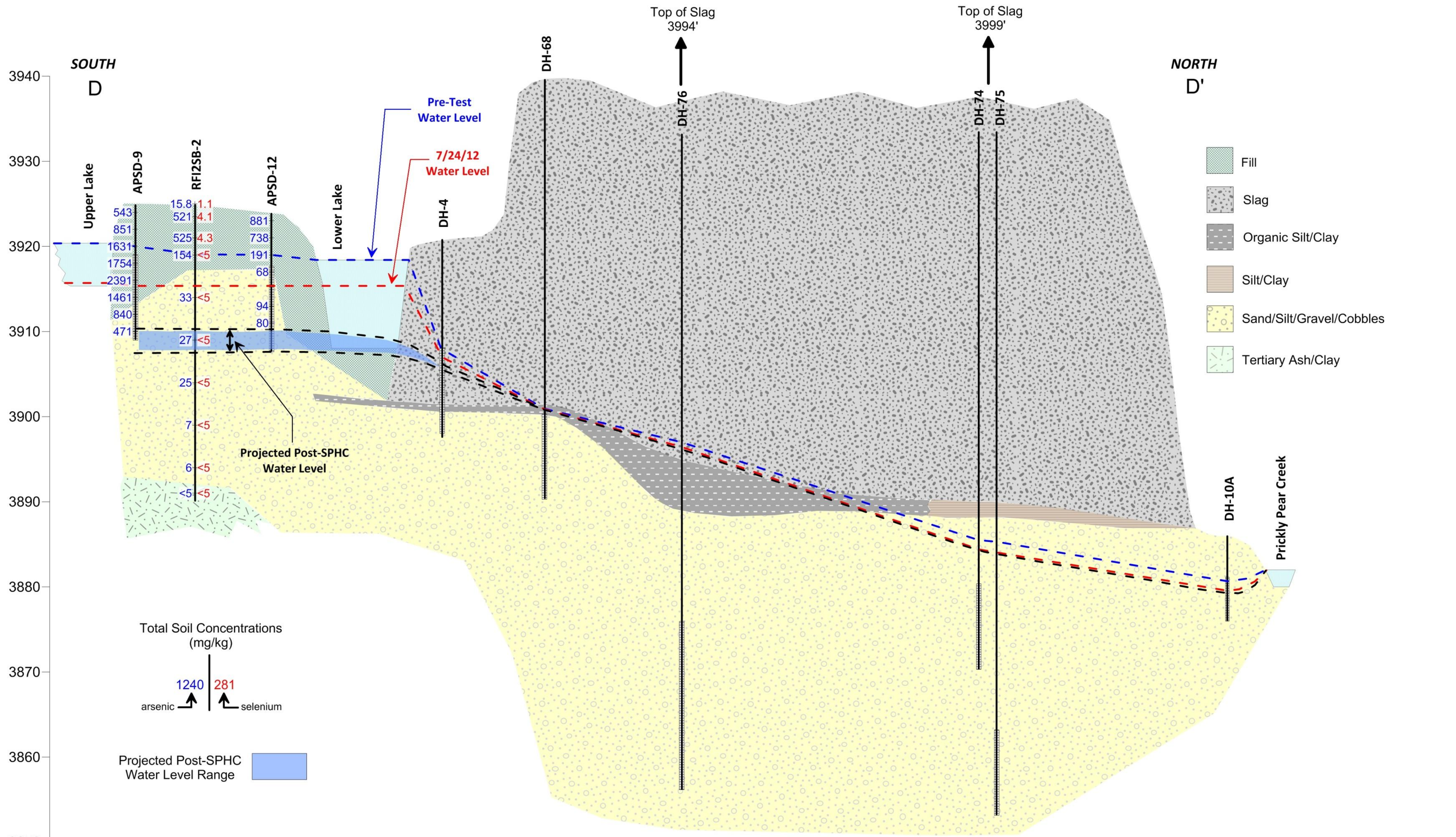
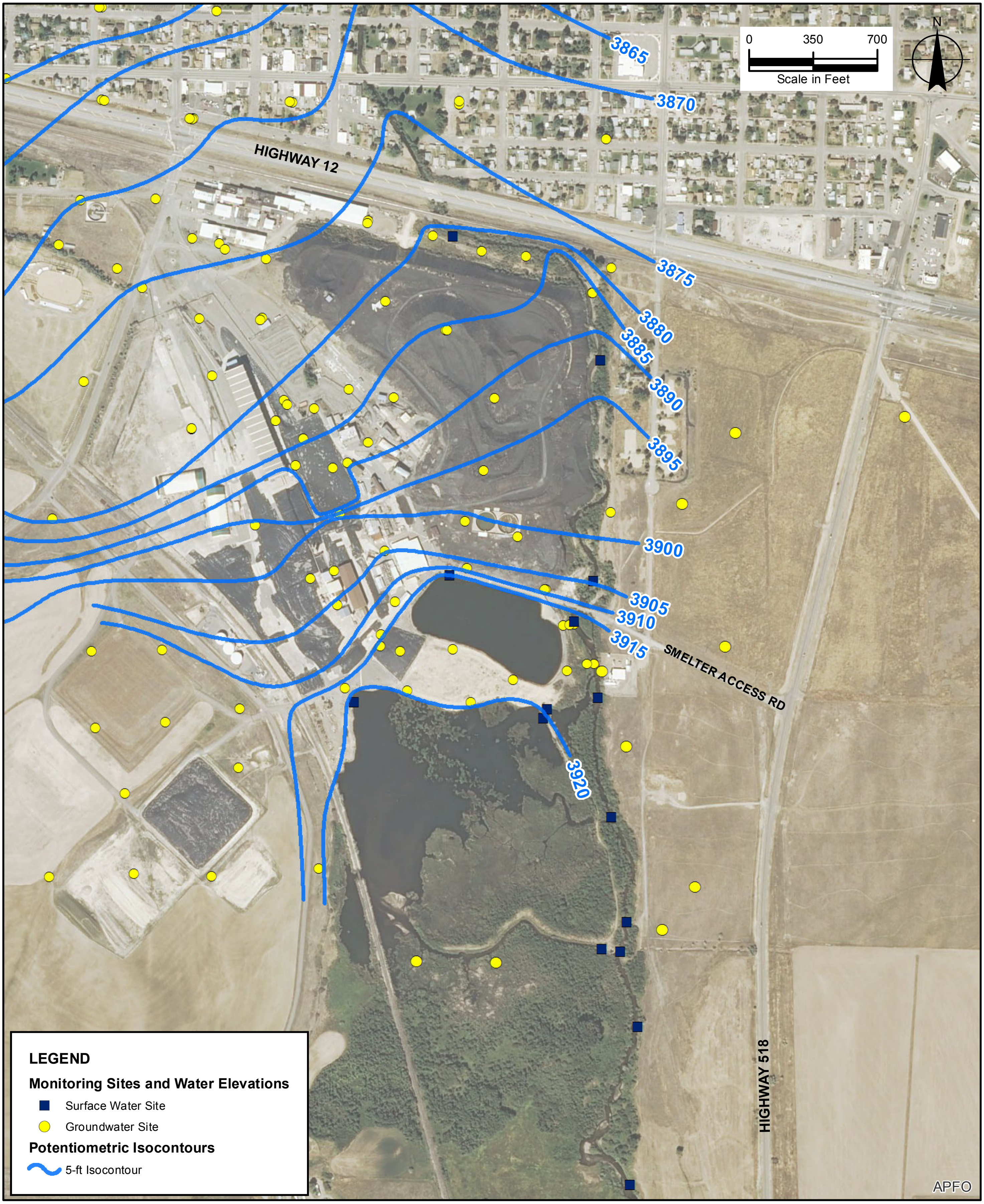


FIGURE 17
SCHEMATIC CROSS-SECTION
UPPER LAKE NORTH
THROUGH SLAG PILE

K:/PROJECT/12015/CSMs/Tito Park-UOS-LLake/ulake_north_xsec.srf



Path: V:\10022\GIS\Upper Lake Drawdown\Tech Memo\Revised_Figs\Figure18.mxd

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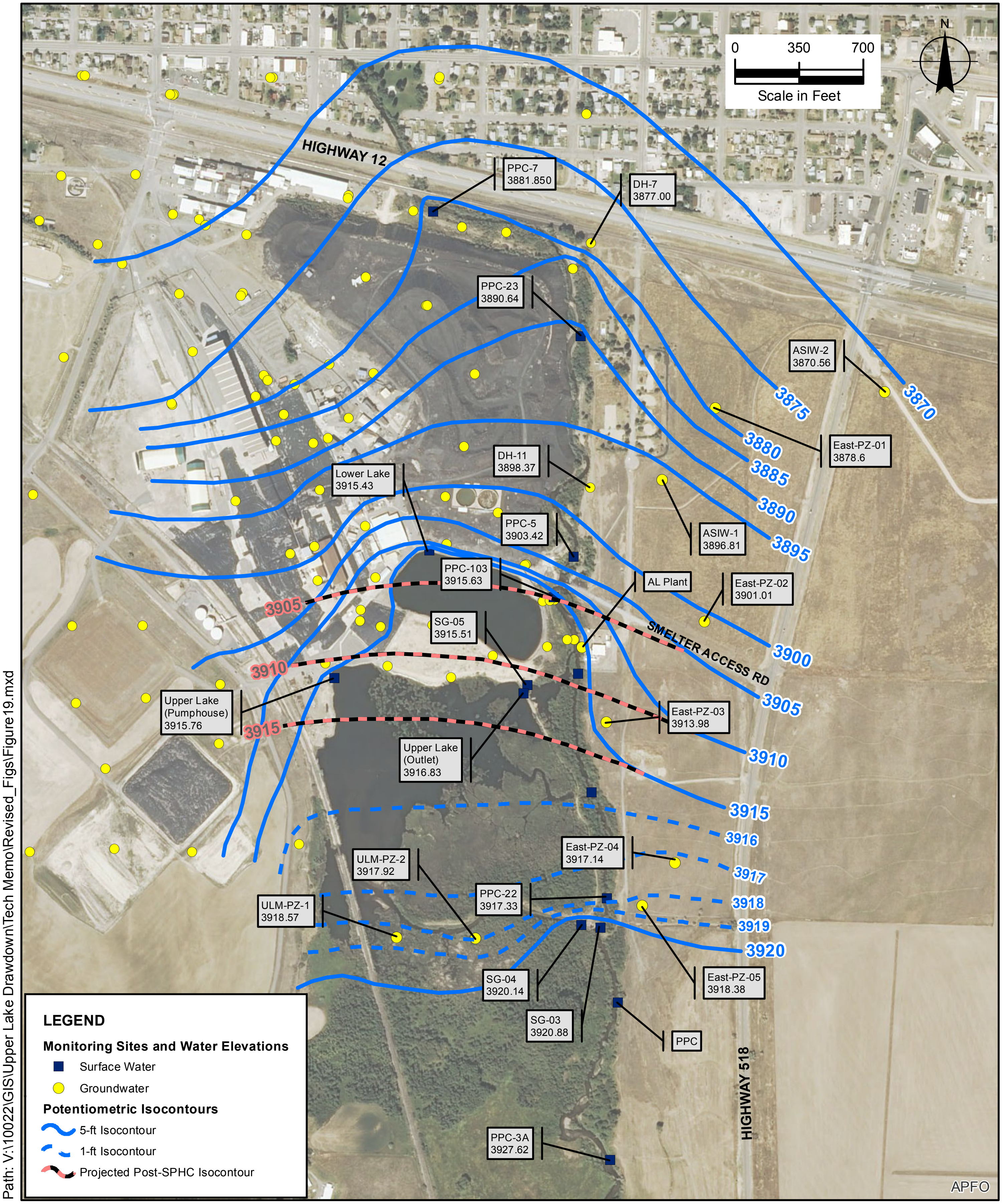
OCTOBER 2010 POTENTIOMETRIC MAP
UPPER LAKE DRAWDOWN TEST
EAST HELENA FACILITY

FIGURE

18



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JULY 24, 2012 POTENTIOMETRIC MAP
UPPER LAKE DRAWDOWN TEST
EAST HELENA FACILITY

FIGURE
19

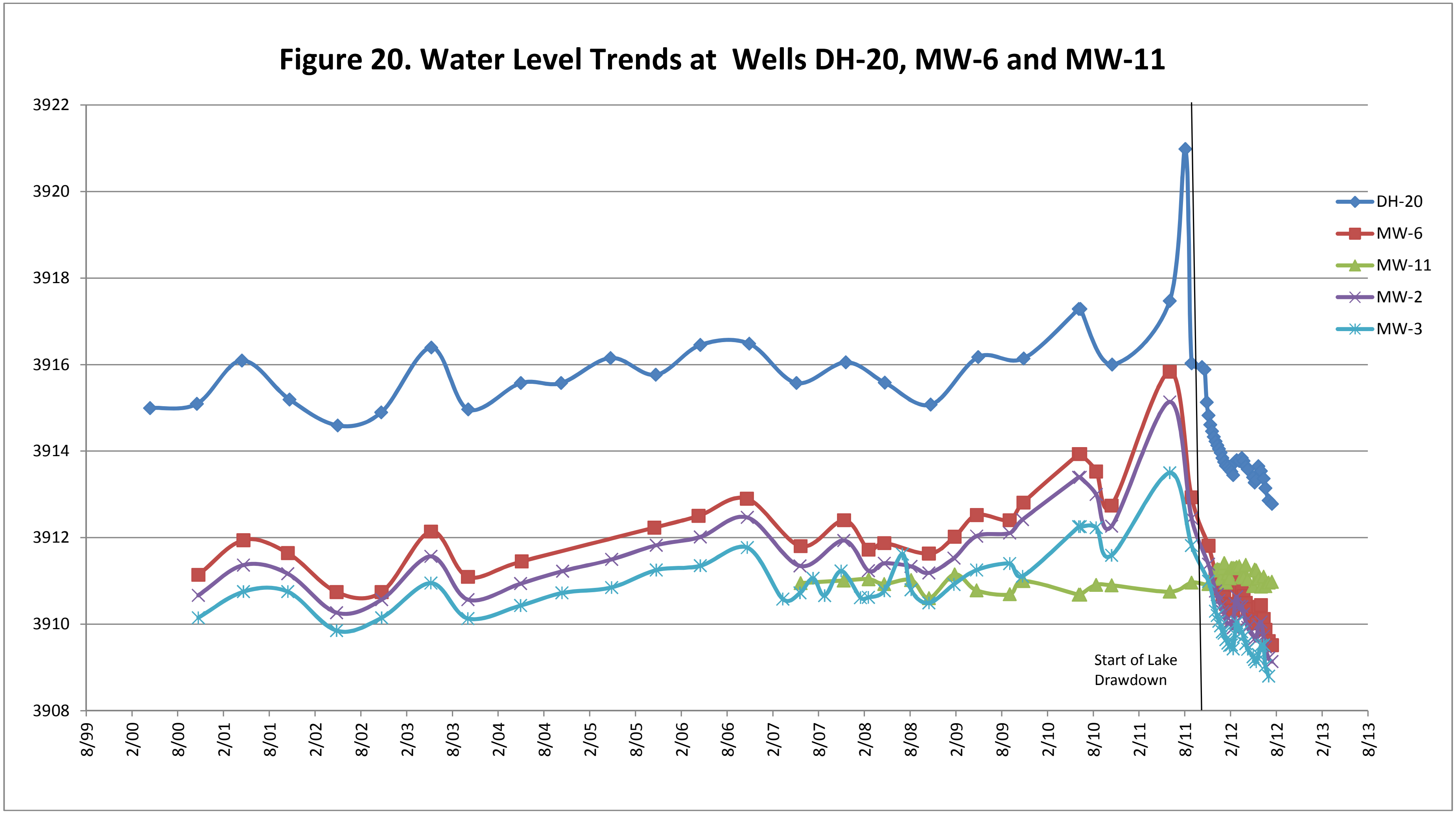
Figure 20. Water Level Trends at Wells DH-20, MW-6 and MW-11
3922
3920
3918
3916
3914
3912
3910
3908
8/99
2/00
8/00
2/01
8/01
2/02
8/02
2/03
8/03
2/04
8/04
2/05
8/05
2/06
8/06
2/07
8/07
2/08
8/08
2/09
8/09
2/10
8/10
2/11
8/11
2/12
8/12
2/13
8/13
DH-20
MW-6
MW-11
MW-2
MW-3
Start of Lake Drawdown

Appendix B
East Bench Soil Data

APPENDIX B

East Bench Soil Data

TABLE 3-4

East Bench Soil Concentrations—Site Investigations

Site Code	Sample ID	Sample Date	Top Depth	Bottom Depth	Arsenic (As)	Cadmium (Cd)	Lead (Pb)	Selenium (Se)
Parcels 18 and 15								
PPC-RZ-1	AEH-1007-314-SL	7/28/2010	0	6	71.8	9.8	665	1.2
PPC-RZ-1	AEH-1007-315-SL	7/28/2010	0	6	63	9.6	683	1.1
UOP-SS17	UOP-SS17-1	3/22/2001	0	4	48	<10	552	
UOP-SS17	UOP-SS17-2	3/22/2001	4	12	41	<10	471	
UOP-SS17	UOP-SS17-3	3/22/2001	12	24	47	<10	439	
UOP-SS17	UOP-SS17-4	3/22/2001	24	36	34	<10	373	
UOP-SS17	AEH-1008-158-SL	8/9/2010	0	6	55	11.7	691	1.2
UOP-SS17	AEH-1008-159-SL	8/9/2010	6	30	39 J	4.7	504 J	<0.5
UOP-SS17	AEH-1008-160-SL	8/9/2010	30	60	59	5.1	440 J	<0.5
UOP-SS19	UOP-SS19-1	3/21/2001	0	4	145	80	2,706	
UOP-SS19	UOP-SS19-2	3/21/2001	4	12	97	79	1,806	
UOP-SS19	UOP-SS19-3	3/21/2001	12	24	43	<10	131	
UOP-SS19	UOP-SS19-4	3/21/2001	24	36	62	<10	51	
UOP-SS20	UOP-SS20-1	3/21/2001	0	4	101	28	1,094	
UOP-SS20	UOP-SS20-2	3/21/2001	4	12	228	55	2,436	
UOP-SS20	UOP-SS20-2D	3/21/2001	4	12	184	46	1,908	
UOP-SS20	UOP-SS20-3	3/21/2001	12	24	23	25	153	
UOP-SS20	UOP-SS20-4	3/21/2001	24	36	<10	<10	35	
UOP-SS20	AEH-1008-162-SL	8/10/2010	0	6	199	73.8	2,180	4.1
UOP-SS20	AEH-1008-163-SL	8/10/2010	6	30	180	34.9	1,290	1.3
UOP-SS20	AEH-1008-164-SL	8/10/2010	30	60	116	20.1	1,070	0.8
UOP-SS21	UOP-SS21-1	3/21/2001	0	4	387	79	3,811	
UOP-SS21	UOP-SS21-2	3/21/2001	4	12	249	23	1,014	
UOP-SS21	UOP-SS21-3	3/21/2001	12	24	10	<10	46	
UOP-SS21	UOP-SS21-4	3/21/2001	24	36	<10	<10	31	
DH-7-1	HYD-8833	11/28/1984	6	7.5	26	3.5	120	
DH-7-1	HYD-8834.A16	11/28/1984	6	7.5	33	3.8	197	<2.6
DH-7-1T	HYD-8159.A14	12/21/1987	0	0.3			8	
DH-7-1T	HYD-8160.A14	12/21/1987	0	0.3			645	
DH-7-1T	HYD-8838	12/21/1987	0	0.3	99	17	889	
DH-7-2	HYD-8835	12/12/1984	18	26	8	<0.5	19	
DH-7-2	HYD-8836	12/12/1984	18	26	8.4	<0.5	19	
DH-7-2	HYD-8837.A16	12/12/1984	18	26	14	<2.3	9	<2.8
DH-7-2T	HYD-8839	12/21/1987	0.3	1	119	20	1,028	
DH-7-2T	HYD-8840	12/21/1987	1	2	75	20	898	
DH-7-4T	HYD-8156	12/21/1987	2	3	54	12	302	

TABLE 3-4

East Bench Soil Concentrations—Site Investigations

Site Code	Sample ID	Sample Date	Top Depth	Bottom Depth	Arsenic (As)	Cadmium (Cd)	Lead (Pb)	Selenium (Se)
DH-7-4T	HYD-8161.A14	12/21/1987	2	3			382	
DH-7-4T	HYD-8841	12/21/1987	2	3	85	15	752 J	
DH-7-6T	HYD-8162.A14	12/21/1987	3	4			269	
DH-7-6T	HYD-8842	12/21/1987	3	4	11	0.5	30	
DH-7-7T	HYD-8163.A14	12/21/1987	4	5			23	
DH-7-7T	HYD-8843	12/21/1987	4	5	13	0.5	30	
DH-11	HYD-8844	1/6/1985	20	21	6	1	19	
DH-11	HYD-8845	1/6/1985	20	21	23	14	115	
DH-11	HYD-7929.A14	12/21/1987	0	0.3	131	37	847	
DH-11	HYD-8846	12/21/1987	0	0.3			2,090	
DH-11	HYD-8847	12/21/1987	0.3	1	13	0.5	33	
DH-11	HYD-8848	12/21/1987	1	2	12	0.9	33	
DH-11	HYD-7925	12/21/1987	1	2	9.8	0.68	27	
DH-11	HYD-7930.A14	12/21/1987	2	3	1	1.8	22	
DH-11	HYD-8849	12/21/1987	2	3			17	
DH-11	HYD-8850	12/21/1987	3	4	22	4.3	324	
DH-11	HYD-7931.A14	12/21/1987	4	5	6	0.5	18	
DH-11	HYD-8851	12/21/1987	4	5			23	
Parcel 17								
Plot 1	Plot 1 - After	Apr-89	0.00	0.33	270	47	2,975	
Plot 1	Plot 1 - After	Apr-89	0.33	0.67	170	59	1,795	
Plot 1	Plot 1 - After	Apr-89	0.67	1.25	95	31	980	
Plot 1	Plot 1 - After	Apr-89	1.25	2.00	60	12	633	
Plot 2	Plot 2 - After	Apr-89	0.00	0.33	249	68	2,488	
Plot 2	Plot 2 - After	Apr-89	0.33	0.67	150	26	980	
Plot 2	Plot 2 - After	Apr-89	0.67	1.25	146	31	1,355	
Plot 2	Plot 2 - After	Apr-89	1.25	2.00	129	29	1,105	
Plot 3	Plot 3 - After	Apr-89	0.00	0.33	216	49	2,090	
Plot 3	Plot 3 - After	Apr-89	0.33	0.67	179	39	1,690	
Plot 3	Plot 3 - After	Apr-89	0.67	1.25	63	9.5	408	
Plot 3	Plot 3 - After	Apr-89	1.25	2.00	23	1.9	121	
Plot 4	Plot 4 - After	Apr-89	0.00	0.33	278	75	2,950	
Plot 4	Plot 4 - After	Apr-89	0.33	0.67	303	71	3,225	
Plot 4	Plot 4 - After	Apr-89	0.67	1.25	216	41	1,815	
Plot 4	Plot 4 - After	Apr-89	1.25	2.00	104	16	808	
79	079	Jun-84	0.00	0.33	188	65	2,190	1

Notes:

All units of depth in feet.
All units of concentration in milligram per kilogram (mg/kg).
< =Less than, detection limit listed after symbol.
J = Estimated, less than reporting limit but above method detection limit.

TABLE 3-5

East Bench Soil Concentrations—West Fields

Sample Sector[(1)]	Sample Date	Sample ID	Laboratory ID	Depth Range	Arsenic (As)	Cadmium (Cd)	Lead (Pb)	Lead U95 (Pb U95)
01A	6/19/1997	WFDH-9706-483	97X-01233	0-12	92	20	879	946
01B	6/19/1997	WFDH-9706-484	97X-01234	0-12	69	16	786	853
01C	6/18/1997	WFDH-9706-477	97X-01227	0-12	109	22	1099	1,167
01D	6/18/1997	WFDH-9706-476	97X-01226	0-12	110	33	1335	1,404
01P	7/25/1996	WFDH-9607-200	96X-05785	0-4	192	32	1,750	1,813
01P	7/25/1996	WFDH-9607-201	96X-05786	4-16	140	29	1,556	1,618
01P	7/25/1996	WFDH-9607-202	96X-05787	16-30	125	11	531	589
02A	6/19/1997	WFDH-9706-485	97X-01235	0-12	73	18	919	986
02B	6/19/1997	WFDH-9706-486	97X-01236	0-12	80	23	846	913
02C	6/18/1997	WFDH-9706-479	97X-01229	0-12	98	45	1,006	1,073
02D	6/18/1997	WFDH-9706-478	97X-01228	0-12	86	20	921	988
02P	7/25/1996	WFDH-9607-203	96X-05788	0-4	107	23	1,030	1,089
02P	7/25/1996	WFDH-9607-204	96X-05789	4-16	92	22	1,018	1,077
02P	7/25/1996	WFDH-9607-205	96X-05790	16-30	57	<5	127	186
03A	6/19/1997	WFDH-9706-487	97X-01237	0-12	113	42	1,231	1,300
03AR	6/19/1997	WFDH-9706-489	97X-01239	0-12	102	25	987	1,054
03B	6/19/1997	WFDH-9706-488	97X-01238	0-12	90	19	895	962
03C	6/18/1997	WFDH-9706-481	97X-01231	0-12	74	15	872	939
03CR	6/18/1997	WFDH-9706-482	97X-01232	0-12	79	19	875	942
03D	6/18/1997	WFDH-9706-480	97X-01230	0-12	75	19	927	994
03P	7/25/1996	WFDH-9607-206	96X-05791	0-4	168	37	1,951	2,016
03P	7/25/1996	WFDH-9607-207	96X-05792	4-16	133	25	1,306	1,366
03P	7/25/1996	WFDH-9607-208	96X-05793	16-30	54	<5	85	144
04P	7/25/1996	WFDH-9607-209	96X-05794	0-4	133	30	1,362	1,423
04P	7/25/1996	WFDH-9607-210	96X-05795	4-16	126	23	1,253	1,313
04P	7/25/1996	WFDH-9607-211	96X-05796	16-30	81	9	384	442
21A	6/24/1997	WFDH-9706-497	97X-01292	0-12	80	17	802	869
21AR	6/24/1997	WFDH-9706-511	97X-01306	0-12	91	17	801	868
21B	6/24/1997	WFDH-9706-498	97X-01293	0-12	81	14	927	994
21C	6/19/1997	WFDH-9706-490	97X-01240	0-12	84	21	890	957
21D	6/19/1997	WFDH-9706-491	97X-01241	0-12	70	15	729	796
22A	6/24/1997	WFDH-9706-499	97X-01294	0-12	89	20	920	987
22B	6/24/1997	WFDH-9706-500	97X-01295	0-12	83	36	992	1,059
22C	6/19/1997	WFDH-9706-492	97X-01242	0-12	88	20	859	926
22D	6/19/1997	WFDH-9706-493	97X-01243	0-12	60	19	835	902
23A	6/24/1997	WFDH-9706-501	97X-01296	0-12	92	29	987	1,054
23B	6/24/1997	WFDH-9706-502	97X-01297	0-12	71	20	749	816
23C	6/19/1997	WFDH-9706-494	97X-01244	0-12	88	23	902	969

TABLE 3-5

East Bench Soil Concentrations—West Fields

Sample Sector[1]	Sample Date	Sample ID	Laboratory ID	Depth Range	Arsenic (As)	Cadmium (Cd)	Lead (Pb)	Lead U95 (Pb U95)
23D	6/19/1997	WFDH-9706-495	97X-01245	0-12	77	17	825	892
24A	6/24/1997	WFDH-9706-503	97X-01298	0-12	79	21	929	996
24D	6/19/1997	WFDH-9706-496	97X-01246	0-12	71	16	729	796
31A	7/7/1997	WFDH-9706-512	97X-01307	0-12	223	45	2,175	2,252
31B	7/7/1997	WFDH-9706-513	97X-01308	0-12	168	38	2,091	2,167
31C	6/24/1997	WFDH-9706-504	97X-01299	0-12	67	18	890	957
31D	6/24/1997	WFDH-9706-505	97X-01300	0-12	138	37	1,612	1,683
32A	7/7/1997	WFDH-9706-514	97X-01309	0-12	112	29	1,322	1,391
32B	7/7/1997	WFDH-9706-515	97X-01310	0-12	81	20	849	916
32C	6/24/1997	WFDH-9706-506	97X-01301	0-12	82	13	694	761
32D	6/24/1997	WFDH-9706-507	97X-01302	0-12	91	23	919	986
33A	7/7/1997	WFDH-9706-516	97X-01311	0-12	102	20	993	1,060
33B	7/7/1997	WFDH-9706-517	97X-01312	0-12	95	18	899	966
33C	6/24/1997	WFDH-9706-508	97X-01303	0-12	82	15	769	836
33D	6/24/1997	WFDH-9706-509	97X-01304	0-12	94	25	1,013	1,080
34A	7/7/1997	WFDH-9706-518	97X-01313	0-12	93	20	965	1,032
34AR	7/7/1997	WFDH-9706-519	97X-01314	0-12	86	18	993	1,060
34D	6/24/1997	WFDH-9706-510	97X-01305	0-12	79	17	955	1,022
41C	7/9/1997	WFDH-9706-521	97X-01316	0-12	195	56	2,927	3,015
41D	7/9/1997	WFDH-9706-520	97X-01315	0-12	240	58	2,417	2,497
42A	7/9/1997	WFDH-9706-527	97X-01322	0-12	104	18	1,100	1,168
42B	7/9/1997	WFDH-9706-528	97X-01323	0-12	112	21	1,209	1,277
42BR	7/9/1997	WFDH-9706-531	97X-01326	0-12	110	24	1,195	1,263
42C	7/9/1997	WFDH-9706-523	97X-01318	0-12	108	23	1,134	1,202
42D	7/9/1997	WFDH-9706-522	97X-01317	0-12	103	18	1,035	1,103
43A	7/9/1997	WFDH-9706-529	97X-01324	0-12	111	26	1,167	1,235
43B	7/9/1997	WFDH-9706-530	97X-01325	0-12	127	36	1,436	1,506
43C	7/9/1997	WFDH-9706-525	97X-01320	0-12	108	23	1,047	1,115
43D	7/9/1997	WFDH-9706-524	97X-01319	0-12	106	21	938	1,005
44A	1/12/1999	WFDH-9901-569	99X-00030	0-12	122	12	893	960
44B	1/12/1999	WFDH-9901-570	99X-00031	0-12	104	13	904	971
44D	7/9/1997	WFDH-9706-526	97X-01321	0-12	104	24	856	923
52C	7/7/1997	WFDH-9706-534	97X-01328	0-12	99	20	804	871
52D	7/9/1997	WFDH-9706-533	97X-01327	0-12	73	19	836	903
53D	7/9/1997	WFDH-9706-535	97X-01329	0-12	101	13	745	812
54A	4/19/2000	WFDH0004-607/54A	00R-04219	0-12	72	10	481	554
54A	4/19/2000	WFDH0004-608/54A	00R-04220	0-12	65	7	480	553
54A	1/7/2000	WFDH-0001-587	00X-00021	0-12	93	18	832	899

TABLE 3-5
East Bench Soil Concentrations—West Fields

Sample Sector[1]	Sample Date	Sample ID	Laboratory ID	Depth Range	Arsenic (As)	Cadmium (Cd)	Lead (Pb)	Lead U95 (Pb U95)
54A	1/12/1999	WFDH-9901-565	99X-00026	0-12	137	17	1,169	1,237
54B	4/19/2000	WFDH0004-609/54B	00R-04221	0-12	86	14	632	705
54B	1/7/2000	WFDH-0001-588	00X-00022	0-12	66	12	564	631
54B	1/12/1999	WFDH-9901-566	99X-00027	0-12	100	9	636	703
54C	4/19/2000	WFDH0004-610/54C	00R-04222	0-12	69	8	479	552
54C	1/7/2000	WFDH-0001-589	00X-00023	0-12	100	12	698	765
54C	1/12/1999	WFDH-9901-567	99X-00028	0-12	121	13	872	939
54D	4/19/2000	WFDH0004-611/54D	00R-04223	0-12	77	11	530	603
54D	1/7/2000	WFDH-0001-590	00X-00024	0-12	68	14	589	656
54D	1/12/1999	WFDH-9901-568	99X-00029	0-12	147	15	1,163	1,231
62A	9/9/1997	WFDH-9709-544	97X-01573	0-12	88	19	783	850
62B	9/9/1997	WFDH-9709-545	97X-01574	0-12	89	16	868	935
62C	9/9/1997	WFDH-9709-547	97X-01576	0-12	83	17	791	858
62D	9/9/1997	WFDH-9709-548	97X-01577	0-12	91	21	1,054	1,122
63A	9/9/1997	WFDH-9709-546	97X-01575	0-12	79	13	693	760
63B	4/19/2000	WFDH0004-602/63B	00R-04214	0-12	94	18	908	981
63B	1/7/2000	WFDH-0001-594	00X-00028	0-12	95	18	992	1,059
63B	1/19/2000	WFDH-0001-596	00X-00247	0-12	103	17	956	1,023
63BR	1/7/2000	WFDH-0001-595	00X-00029	0-12	113	21	1,037	1,105
63BR	1/19/2000	WFDH-0001-597	00X-00248	0-12	104	21	998	1,065
63D	9/9/1997	WFDH-9709-549	97X-01578	0-12	88	15	726	793
63DR	9/9/1997	WFDH-9709-550	97X-01579	0-12	75	17	742	809
64A	4/19/2000	WFDH0004-603/64A	00R-04215	0-12	75	16	669	742
64A	1/7/2000	WFDH-0001-583	00X-00017	0-12	89	14	829	896
64A	1/12/1999	WFDH-9901-560	99X-00021	0-12	145	18	1,242	1,311
64B	4/19/2000	WFDH0004-604/64B	00R-04216	0-12	82	13	613	686
64B	1/7/2000	WFDH-0001-584	00X-00018	0-12	75	9	480	547
64B	1/12/1999	WFDH-9901-561	99X-00022	0-12	81	6	502	569
64C	4/19/2000	WFDH0004-605/64C	00R-04217	0-12	90	9	580	653
64C	1/7/2000	WFDH-0001-585	00X-00019	0-12	75	13	506	573
64C	1/12/1999	WFDH-9901-563	99X-00024	0-12	95	6	669	736
64D	4/19/2000	WFDH0004-606/64D	00R-04218	0-12	64	8	508	581
64D	1/7/2000	WFDH-0001-586	00X-00020	0-12	74	12	684	751
64D	1/12/1999	WFDH-9901-564	99X-00025	0-12	196	19	1,412	1,482
65A	1/12/1999	WFDH-9901-562	99X-00023	0-12	87	8	480	547
72A	9/9/1997	WFDH-9709-536	97X-01565	0-12	87	14	682	749
72B	9/9/1997	WFDH-9709-537	97X-01566	0-12	73	17	737	804
72C	9/9/1997	WFDH-9709-540	97X-01569	0-12	81	17	818	885

TABLE 3-5

East Bench Soil Concentrations—West Fields

Sample Sector[(1)]	Sample Date	Sample ID	Laboratory ID	Depth Range	Arsenic (As)	Cadmium (Cd)	Lead (Pb)	Lead U95 (Pb U95)
72D	9/9/1997	WFDH-9709-541	97X-01570	0-12	107	19	1,030	1,098
73A	9/9/1997	WFDH-9709-538	97X-01567	0-12	81	21	671	738
73B	1/7/2000	WFDH-0001-592	00X-00026	0-12	85	18	706	773
73B	9/9/1997	WFDH-9709-539	97X-01568	0-12	95	20	788	855
73C	4/19/2000	WFDH0004-601/73-C	00R-04213	0-12	115	19	905	978
73C	1/7/2000	WFDH-0001-593	00X-00027	0-12	103	17	860	927
73C	9/9/1997	WFDH-9709-542	97X-01571	0-12	84	19	907	974
73D	9/9/1997	WFDH-9709-543	97X-01572	0-12	85	16	665	732
74A	1/7/2000	WFDH-0001-577	00X-00011	0-12	77	10	605	672
74A	1/12/1999	WFDH-9901-553	99X-00014	0-12	100	16	927	994
74B	1/7/2000	WFDH-0001-578	00X-00012	0-12	80	13	671	738
74B	1/12/1999	WFDH-9901-554	99X-00015	0-12	159	24	1,335	1,404
74C	4/19/2000	WFDH0004-599/74C	00R-04211	0-12	106	17	876	949
74C	1/7/2000	WFDH-0001-579	00X-00013	0-12	107	13	754	821
74C	1/12/1999	WFDH-9901-556	99X-00017	0-12	178	23	1,731	1,803
74D	4/19/2000	WFDH0004-600/74D	00R-04212	0-12	84	14	774	847
74D	1/7/2000	WFDH-0001-580	00X-00014	0-12	91	17	819	886
74D	1/12/1999	WFDH-9901-557	99X-00018	0-12	97	11	703	770
75A	1/7/2000	WFDH-0001-581	00X-00015	0-12	104	21	689	756
75A	1/12/1999	WFDH-9901-555	99X-00016	0-12	114	12	958	1,025
75D	4/19/2000	WFDH0004-598/75-D	00R-04210	0-12	99	21	1,069	1,143
75D	1/7/2000	WFDH-0001-582	00X-00016	0-12	99	9	733	800
75D	1/12/1999	WFDH-9901-558	99X-00019	0-12	76	8	465	532
75D-R	1/12/1999	WFDH-9901-559	99X-00020	0-12	76	10	492	559
81A	10/24/1996	WFDH-9610-471	96X-10371	0-12	86	14	632	690
81AR	10/24/1996	WFDH-9610-475	96X-10375	0-12	79	12	616	674
81B	10/24/1996	WFDH-9610-472	96X-10372	0-12	45	10	395	453
81D	10/24/1996	WFDH-9610-474	96X-10374	0-12	86	15	716	774
82A	10/29/1996	WFDH-9610-469	96X-10369	0-12	79	11	662	720
82B	9/19/1996	WFDH-9609-460	96X-08830	0-12	88	12	522	580
82C	9/19/1996	WFDH-9609-461	96X-08831	0-12	75	10	549	607
82D	10/29/1996	WFDH-9610-470	96X-10370	0-12	70	14	420	478
83A	9/19/1996	WFDH-9609-462	96X-08832	0-12	111	18	770	828
83B	9/19/1996	WFDH-9609-463	96X-08833	0-12	108	15	887	946
83C	9/19/1996	WFDH-9609-464	96X-08834	0-12	93	14	762	820
83D	9/19/1996	WFDH-9609-465	96X-08835	0-12	81	14	615	673
84A	9/19/1996	WFDH-9609-466	96X-08836	0-12	114	14	876	935
84B	1/7/2000	WFDH-0001-572	00X-00006	0-12	95	16	721	788

TABLE 3-5
East Bench Soil Concentrations—West Fields

Sample Sector[1]	Sample Date	Sample ID	Laboratory ID	Depth Range	Arsenic (As)	Cadmium (Cd)	Lead (Pb)	Lead U95 (Pb U95)
84B	1/7/2000	WFDH-0001-591	00X-00025	0-12	95	17	724	791
84B	9/19/1996	WFDH-9609-467	96X-08837	0-12	84	13	698	756
84C	1/7/2000	WFDH-0001-573	00X-00007	0-12	116	15	825	892
84C	1/12/1999	WFDH-9901-551	99X-00012	0-12	115	15	1,153	1,221
84D	1/7/2000	WFDH-0001-574	00X-00008	0-12	101	13	779	846
84D	9/19/1996	WFDH-9609-468	96X-08838	0-12	104	16	857	916
85A	1/7/2000	WFDH-0001-575	00X-00009	0-12	107	17	768	835
85D	1/7/2000	WFDH-0001-576	00X-00010	0-12	97	15	766	833
85D	1/12/1999	WFDH-9901-552	99X-00013	0-12	80	16	688	755

Notes:

All units of depth in inches.

All units of concentration in milligram(s) per kilogram (mg/kg).

[1] See Figure 3-14 for sample sector ID.

< = Less than, detection limit listed after symbol.
Pb U95 = Lead concentration, upper 95% confidence limit.

Appendix C
Prickly Pear Creek Temporary Bypass Preliminary List of Specifications

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* = not included in this submittal Pages

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END OF SECTION

Appendix D
Public Comments Received on the 2013 Interim Measures Work Plan with U.S. Environmental Protection Agency Responses

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8, MONTANA OFFICE
FEDERAL BUILDING, 10 W. 15th STREET, SUITE 3200
HELENA, MONTANA 59626

Ref: 8MO

SENT VIA E-MAIL

January 31, 2013

Ms. Cynthia Brooks
Montana Environmental Trust Group
Trustee of the Montana Environmental Custodial Trust
100 Smelter Road
P. O. Box 1230
East Helena, MT 59635

Re: Conditional Approval of the Draft *Former ASARCO East Helena Facility Interim Measures Work Plan – 2013*, dated November 7, 2012.

Dear Ms. Brooks,

On November 7, 2012, EPA submitted the Draft *Former ASARCO East Helena Facility Interim Measures Work Plan – 2013,* dated November 7, 2012, for public review and comment as required in paragraph 72 of the First Modification to the 1998 USA v. ASARCO Consent Decree. EPA received seven comments on the Work Plan and has provided responses to the comments (see attached).

Today, EPA is approving the proposed work for 2013, as detailed in the Draft *Former ASARCO East Helena Facility Interim Measures Work Plan – 2013*, with the following conditions:

- The Montana Environmental Trust Group (METG) will incorporate modifications as requested in the EPA Response to Comments (see attachment);
- The comments submitted, along with the EPA responses, will be incorporated as an appendix into the 2013 Final Work Plan; and
- Annual Interim Measure Work Plans for 2014, 2015 and possibly 2016 will be provided to EPA with scheduling for adequate time for public comment and review.

Please provide the Final 2013 Work Plan with the requested changes to EPA within thirty days. If you have any questions on this letter or any related matter, please contact me directly at (406) 457-5013.

Sincerely,

Betsy Burns

Betsy Burns
Project Manager

Attachment

1/30/2013 EPA RESPONSE TO THE COMPANY DITCH USERS COMMENTS ON THE *FORMER ASARCO EAST HELENA FACILITY INTERIM MEASURES WORK PLAN – 2013*

December 6, 2012

Betsy Burns
U.S. EPA Region 8
10 West 15th Street, Suite 3200
Helena MT 59626

Subject: <u>Former ASARCO East Helena Facility Interim Measures Work Plan – 2013</u>
Company Ditch Users

Dear Ms. Burns,

Thank you for the opportunity to comment of the above referenced work plan. The Company Ditch users have reviewed the work plan and would like to submit the following comments.

- The Company Ditch is not referenced in the Work Plan. This ditch has a diversion at the Smelter Dam and runs to the east to the Eastgate and Hamlin properties. The two users of the ditch are Eastgate Water Sewer Association and Hamlin Family Revocable Living Trust.

  EPA Response: As is currently the case, Prickly Pear Creek water will be available for diversion from the creek and the By-pass. It is EPA's understanding that the Custodial Trust expects to allow reasonable access to the diversion and Prickly Pear Creek (PPC) for the users of the Company Ditch.

- The Company Ditch users want to put it on record, this ditch is not abandoned and conveyance needs to be maintained to allow for irrigation or mitigation usage by the users.

  EPA Response: EPA neither agrees, nor disagrees with the statements made in this comment. Representatives from EPA and the Custodial Trust met with representatives of the Eastgate Water Sewer Association on April 1, 2012 at EPA's offices and, at that time, requested information on the Company Ditch. Before the Trust can propose appropriate steps regarding the point of diversion, both the Trust and EPA need additional information about the current status of the ditch. Please provide the Custodial Trust with information showing the legal status of the ditch and whether it is still physically possible to convey water from the point of diversion to the claimed place of use and documentation of use of PPC water

- The document states on Page 7-2 the Trust is looking for cost-effective delivery for the users of the Wilson Ditch, yet the Company Ditch users "will be required to establish temporary POD connections". We feel this should be the responsibility of the Trust not the ditch users.

  EPA Response: Unlike the Company Ditch, the point of diversion for Wilson Ditch irrigation water users is currently located on Upper Lake. Because Upper Lake is being eliminated as part of the South Plant Hydraulic Control (SPHC) Interim Measure, the Wilson ditch diversion point needs to be moved to allow users access to PPC water. The Company Ditch, on the other hand, diverts water directly from PPC. The Custodial Trust will continue to allow reasonable access to the diversion and PPC for the users of the Company Ditch.

- The work plan notes the water transmission line to East Helena is to be relocated to allow for the diversion of Prickley Pear Creek. The water transmission line crosses under the Company Ditch, we would like to have coordination on this work to prevent adverse impacts.

EPA Response: The Trust has concluded, and EPA agrees, that there will be no adverse impacts to the Company Ditch from construction of the City of East Helena water line**.** EPA is requesting that the Custodial Trust notify the users of the Company Ditch when the construction of the City of East Helena water line will be nearing the location of the Company Ditch, so that water rights holders may view the activities.

The Company Ditch users would like to work with the Trust to formulate a workable solution for both the ditch users and the Trust. Please contact Paul Johnson of Eastgate Water Sewer Association at 444-7259 or Jerry Hamlin of Hamlin of Hamlin Family Revocable Living Trust at 443-1340 LLC to discuss times for a potential meeting.

EPA Response: EPA is requesting that the Company Ditch users provide the information requested in 2 above to the Custodial Trust. Once the above information has been received and evaluated, the Custodial Trust would be happy to contact Mr. Johnson and Mr. Hamlin to discuss the details of reasonable future access to the Company Ditch.

Again thank you for the opportunity to comment on the proposed Work Plan.

EPA Response: Thank you for taking the time to review and respond to the 2013 Interim Measures Work Plan.

Sincerely,
Paul Johnson, Chair
Eastgate W/S Association
&
Jerry Hamlin, Trustee

Hamlin Family Revocable Living Trust

1/30/2013 EPA RESPONSE TO JAMES SCHELL'S COMMENTS ON THE *FORMER ASARCO EAST HELENA FACILITY INTERIM MEASURES WORK PLAN – 2013*

From: "James Schell" <jamie@schell.net>
To: Betsy Burns/MO/R8/USEPA/US@EPA
Date: 12/07/2012 04:18 PM
Subject: 2013 IM Work Plan Comments

Hi Betsy,

Just to let you know I have no comments regarding the Draft 2013 IM Work Plan that I would like to officially submit.

Although I didn't spend as much time re-reviewing the plan in detail as I would have liked, I did spend a considerable amount of time reading through it and researching minor questions that came up.

Thanks for all of your work and thanks for keeping the public informed on items such as this and giving ample opportunity to comment.

All the best,
Jamie

EPA Response: Thank you for taking the time to review and respond to the 2013 Interim Measures Work Plan. EPA appreciates your support of the proposed 2013 interim measures. EPA and the Custodial Trust plan to continue to engage the community of East Helena as the interim measures are implemented.

1/30/2013 EPA RESPONSE TO THE LEWIS AND CLARK COUNTY WATER QUALITY PROTECTION DISTRICT'S COMMENTS ON THE *FORMER ASARCO EAST HELENA FACILITY INTERIM MEASURES WORK PLAN – 2013*

December 7, 2012

Betsy Burns, RCRA Project Manager
EPA Region 8, Montana Office
10 West 15th St., Suite 3200
Helena, MT 59626

Re: Comments on Former ASARCO East Helena Facility Interim Measures Work Plan - 2013

The Lewis and Clark County Water Quality Protection District (WQPD) are providing the following comments on the ASARCO East Helena Facility Interim Measures Work Plan – 2013 (2013 IMWP) issued November 7, 2012 by the Montana Environmental Trust Group, LLC (METG) and opened to public comment by the U.S. Environmental Protection Agency (EPA). The primary comments to the 2013 IMWP document are focused on the technical issues of the actions proposed to be implemented in 2013 as described in the document. These action include: the construction of the stream bypass channel, demolitions of smelter site structures, bridge access across the bypass and Prickly Pear Creek, and a re-examination of the waste materials on site and determination of removal and disposal options for those materials. These comments are contained within the attached memo written by James Swierc, Hydrogeologist of the WQPD.

Although not planned for current implementation in 2013 according to the 2013 IMWP there is a significant discussion in "Section 2.2 Source Removal IM Evaluations and Corrective Action Unit 3" (pp. 2-2 to 2-5) regarding the concept of building a third Corrective Action Unit (CAMU) within the former smelter site, more specifically in the former Lower Ore Storage Area or LOSA.

This potential activity is not planned at this time and it is stated in the document's introduction that if construction of third CAMU is proposed, a separate technical report will be prepared for public comment. The discussion in the 2013 IMWP summarizes the regulatory context and some issues of consideration for the cleanup action, however the WQPD will reserve our comments, until the full analysis of the need and the specifics of the potential CAMU design, location and justification are provided by METG.

One comment on the proposed location of CAMU 3 in the LOSA as displayed within the 2013 IMWP in several figures including 2-3 and 3-7 is that the actions proposed as "interim measures" have been stated to be open to adaptative management once completed to ensure their goals of protectiveness of human health and the environment. An EPA response to a comment to the 2012 Interim Measures Work Plan states "The interim measures are being phased and designed such that they will not preclude the implementation of other remedial actions if they are found not to be effective."

The District believes construction of CAMU 3 in the locations indicated in the 2013 IMWP would preclude any further work in addressing subsurface contamination underlying the thousands of cubic yards of hazardous waste to be place in this engineered repository. Should the South Plant Hydraulic Control and the ET capping not control the water levels and pollutant sources as predicted, any other actions in this area to address contamination would not be feasible. For example, Figure 3-6 shows what appears to be the source area of the selenium plume to be in the LOSA within the proposed CAMU 3 location. If the other interim measures do not improve the groundwater contamination in this area, no other activity could be contemplated if the CAMU was built on top of this site.

EPA Response: EPA agrees that construction of a third CAMU in the LOSA effectively precludes further corrective measures for contaminated soils located beneath the CAMU. As referenced in the 2013 IMWP in Section 2.2.3, this is one of the reasons the Custodial Trust is in the process of updating the conceptual site models for the former Smelter Site and conducting additional technical evaluations, including the feasibility and environmental benefit of source removal, before proceeding with further CAMU and ET Cover System design work.

Thank you for the opportunity to comment on the Former ASARCO East Helena Facility Interim Measures Work Plan – 2013. We look forward to the EPA response to these comments.

EPA Response: Thank you for taking the time to review and respond to the 2013 Interim Measures Work Plan.

Sincerely,

James Wilbur
Water Quality District Coordinator
Lewis & Clark County
Water Quality Protection District

Attachment: WQPD Memo by James Swierc dated December 7, 2012

CC: Cindy Brooks, METG
Lewis & Clark Commissioners
Melanie Reynolds, L&C Co. Health Officer
Eric Bryson, L&C Co. Administrator
City of East Helena Mayor & City Council

MEMORANDUM

Date: December 7, 2012

To: METG, EPA

From: James Swierc
LCWQPD Hydrogeologist

Re: Review of 2013 Interim Measures Work Plan

This memo provides review comments on the 2013 Interim Measures Work Plan for the former Asarco smelter site in East Helena. These comments focus on the technical content contained within the work plan document.

General Comments

1. The document presents activities to be completed at the site during 2013 related to the implementation of the interim measures as outlined in the 2012 Interim Measures Work Plan (2012 IMWP). The document provides general information from past and ongoing site characterization work for the site, providing the technical basis for the interim measures. While they are referenced in the document, it would be useful for the reader to acknowledge and reference these documents in the introduction, and noting that the reader can review these documents for further background information on the site. Specific examples where this would be useful later in the document include Section 3, the Updated Conceptual Site Model, where the text should note, by reference, which earlier conceptual model was updated.

EPA Response: This IM Work Plan 2013 builds on information presented in previous work plans, reports and technical memoranda prepared by the Custodial Trust. A complete list of references is provided in Section 9.

2. The overall tone of the document reflects a need for and construction of a third Corrective Action Management Unit (CAMU) for the site. However, there are several references to potentially not constructing the CAMU for a variety of reasons. These references list activities that will be completed to assess the need for the CAMU. These activities represent work to be conducted relevant to the characterization of the site, and the completion of the interim measures to be implemented at the site. As such, a more thorough discussion of the specific activities would be useful, including identifying which results or trigger points would be used to determine the need for the third CAMU.

EPA Response: EPA committed in the August 28, 2012 response to comments on the *Final Draft Former ASARCO East Helena Facility Interim Measures Work Plan – Conceptual*

Overview of Proposed Interim Measures and Details of 2012 Activities, to provide additional information on the CAMU #3 siting criteria in the draft 2013 IMWP. The Custodial Trust is in the process of updating the conceptual site models for the former Smelter Site and evaluating the feasibility and environmental benefit of source removal before proceeding with further CAMU and ET Cover System design work.

3. In the discussion of the site geology and hydrogeology, the "Upper Aquifer" is identified as the younger valley-fill sediments overlying the Oligocene weathered clayey-ash. While this terminology seems appropriate, it is inconsistent with previous terminology historically used at the site to divide the current "Upper Aquifer" into upper and lower portions. Since this will be confusing to the public familiar with previous terminology, the specific change in terminology should be explained.

EPA Response: Delineation of an upper and lower portion of the shallow aquifer (previously referred to as the Upper Aquifer) was discontinued in 2009 as first described in the Phase II RFI Work Plan. To clarify this point EPA is requesting that the Custodial Trust insert the following text from the Phase II RFI Work Plan in the 2013 IMWP.

"In previous investigations (ACI, 2005), the upper aquifer was divided into a shallow aquifer and deeper 'intermediate' aquifer based on the presence of these fine-grained lenses. Based on further review of available information the shallow and deeper portions of the upper aquifer are believed to be in direct hydrologic communication and to act as a single shallow aquifer system."

Specific Comments

1. p 2-4, Section 2.2.4.3. The discussion of the protectiveness of the selected CAMU location to protect local ground water resources is unclear. The identification of the vadose zone as 30 to 40 feet thick notes that there is "significant" separation between the CAMU and ground water. From a larger, regional perspective, this vadose zone thickness is not particularly thick. Further, the unconsolidated sediments are relatively coarse, with the exception of the silt layer, which would act as a barrier to mitigate the impacts of any contaminant releases. The discussion also notes that the fine-grained ash layer is at 30 to 50 feet bgs which, based on the initial characterization of vadose zone thickness, suggests there is no shallow ground water there. The depth to ground water should be noted in a consistent manner with the stratigraphic discussion.

EPA Response: EPA consulted with the Custodial Trust on this comment and the Custodial Trust has provided the following clarification. The stratigraphy and occurrence of groundwater near the center of the proposed CAMU area is delineated by monitoring well pair DH-61 and DH-62. The ash/clay layer was encountered at 30 feet in these borings, with DH-61 screened from 20 to 30 feet below ground surface. Since completion in May 2001, groundwater has never been present in DH-61 even throughout the very wet 2011 spring season. DH-62 is completed at a depth of 65 to 75 feet at the same location with static water levels ranging from 40 to 45 feet, or 10 to 15 feet below the top of the ash/clay. This information demonstrates that the tertiary sediments above the lower permeability ash/clay unit are unsaturated at this location.

Other monitoring wells within the proposed CAMU 3 footprint include DH-60 and DH-71, both located near the southern end of the proposed CAMU. DH-60 encountered the tertiary ash/clay layer at about 20 feet and was screened at a depth of 20 to 35 feet bgs. The alluvial sediments above the ash/clay layer were reported to be dry at the time of drilling. From 2001 to 2006, static water levels in DH-60 varied from about 25 to 29 feet bgs with the water apparently derived from sandier zones within the ash/clay. DH-60 was abandoned in 2007.

DH-71 encountered tertiary ash/clay at 33.5 feet and is completed from 24 to 34 feet. From 2008 through 2011 the static water level has ranged from 26 to 30 feet bgs. In 2012 when the Upper Lake drawdown test was underway, static water levels in DH-71 ranged from 30 to 32 feet. With the ash/clay layer at 33.5 feet, it is predicted that the alluvial sediments above the ash/clay layer will be unsaturated following implementation of the SPHC

Water level data from wells DH-61/62, DH-60 and DH-71 represent all groundwater level data available within the proposed CAMU 3 footprint. EPA is requesting that the Custodial Trust clarify this information in the revised 2013 Work Plan.

The discussion notes that the nearest active fault(s) are more than two miles away from the site based on Stickney (2000), and that the nearest known faults are more than 1.5 miles away. The use of this reference at the local scale is not appropriate since major earthquakes are noted in the Helena Valley since 1900, and a number of minor earthquakes since 1982 have been identified. While this map does not identify the active faults for these earthquakes, they may be inferred from the geologic map by Mitchell included with the USGS report on Helena Area Bedrock Aquifers by Thamke (2000). The discussion in this section is inconsistent with the discussion in Section 3.1.2 which notes that the southern end of the Helena Valley is "defined by a series of major seismically active faults, including one inferred to be approximately 1,500 feet north" of the site. The discussion between the two sections should be consistent.

EPA Response: EPA is requesting that the Custodial Trust correct this discrepancy in the revised 2013 Work Plan. EPA is also considering the value of this information to the proposed interim measures. If it does not add significant value, then EPA will request that the Trust shorten the discussion in addition to ensuring that the information is correct.

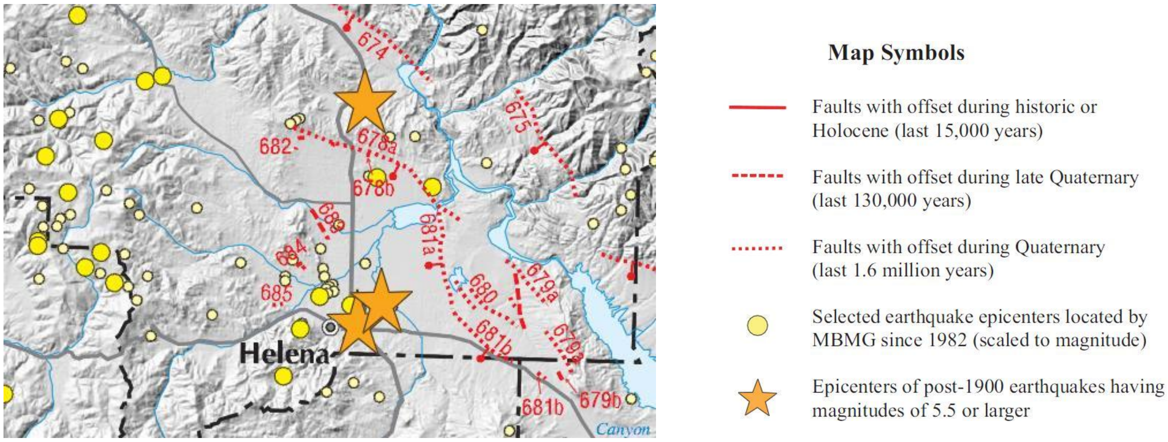

Figure –Map from Stickney (2000) noting Helena Valley Active Faults and Earthquakes

2. p 3-3, Table 3-3. The recharge source to the deeper ground water system as "Snowmelt, direct precipitation, and seepage from losing streams" is inconsistent with the site conceptual model which notes an upward gradient from this aquifer to the shallow aquifer. Since the deeper aquifer is not exposed to the surface within the area proximal to the site, recharge to this unit must result from flow between deep bedrock units into the valley sediments.

EPA Response: EPA consulted with the Custodial Trust which has provided the following clarification. Although recharge from direct precipitation, snowmelt and seepage from losing streams does not occur at the Facility, it is possible for such recharge to occur in up-gradient areas south of the Facility. EPA is requesting that the Custodial Trust change the description to note that, "Recharge to the deeper groundwater system likely occurs through upward seepage from deeper bedrock units on and near the plant site, and possibly from direct precipitation, snowmelt, stream leakage, and downward seepage from overlying units in up-gradient areas south of the plant site".

3. p 3-4, Section 3.2.2 and onward. The references to batch adsorption test results should identify a source reference where the reader may review the experiments and results.

EPA Response: EPA is requesting that the Custodial Trust add a reference to the Phase II RFI report in the appropriate sections.

4. p 3-15, Figure 3-4. It would be useful to identify and separate the coarse grained primary aquifer from the fine-grained water bearing units in the volcaniclastic deposits immediately west of the site, which is technically a separate aquifer which discharges into the high permeability alluvial aquifer.

EPA Response: EPA notes that this information was presented in Figure 3-2 of the Interim Measures Work Plan 2012, which shows the geology of the Helena Valley.

5. p 4-1, Section 4. The discussion of hydrogeologic data notes that additional data is being collected. Reference to development of a Field Sampling and Analysis Plan (FSAP) for 2013 should be included so that the reader is aware that the hydrogeologic assessment activities will continue.

EPA Response: EPA is requesting that the Custodial Trust add a reference to the 2013 FSAP in the revised 2013 IM Work Plan.

6. Appendix A, Upper Lake Drawdown Test Memo. The discussion is generally complete; however, the use of the Airport North well hydrograph for comparison with on-site water level changes as confirmation that the changes are not climate related is not appropriate. The Airport North well is part of the LCWQPD Monitoring Well network, and is installed immediately downgradient of the Helena Valley Irrigation canal. As a result, the large seasonal change in water levels monitored at that well is directly related to flows in the canal, which are of sufficient magnitude to cover any climate related changes in water levels at that location.

EPA Response: At EPA's request, the Custodial Trust provided the following clarification. Comparison of the northwest Facility wells and Airport North Well water levels is intended to demonstrate that, despite the low precipitation in 2012, wells that are normally influenced by recharge from irrigation continued to show this pattern in 2012 (particularly at the Airport North well). The fact that water levels did not rise in the northwest plant site wells during the 2012 irrigation season is most likely due to the lack of irrigation recharge (flow and related leakage from Wilson Ditch) as opposed to the low precipitation. If 2012 water levels at the Airport North well did not show the typical rise in response to the irrigation canal flow, then the conclusion would have been that the dry conditions outweighed the effects of the irrigation recharge; therefore the dry weather could account for the lack of increase in the north plant site groundwater levels. Thus, the Trust argues, and EPA agrees, that the Airport North Well data is appropriate for the referenced discussion.

1/30/2013 EPA RESPONSE TO THE STATE OF MONTANA DEPARTMENT OF TRANSPORTATION'S COMMENTS ON THE *FORMER ASARCO EAST HELENA FACILITY INTERIM MEASURES WORK PLAN – 2013*

December 6, 2012

Betsy Burns
U.S. EPA Region 8
10 West 15th Street, Suite 3200
Helena MT 59626

Subject: Former ASARCO East Helena Facility Interim Measures Work Plan 2013
Montana Department of Transportation Comments

Dear Betsy,

The Montana Department of Transportation (MDT) staff has reviewed the Former ASARCO East Helena Facility Interim Measures Work Plan - 2013 and has the following comments.

- In the sections concerning Status of Permitting Activities and Approvals there is no mention of MDT permitting requirements. Any work within MDT right-at-way requires a permit from MDT for encroachment.
    - For utility work (water main or power relocations) where the crossing of US 12 or MT 518 is proposed. Please contact Janet Black, Butte District Utility Agency (406-494-9619) for the required permits.
    - For construction work, where companies need to access MDT right-of-way please contact Kevin Millhouse, Helena Maintenance Superintendent (406-444-6399).

EPA Response: EPA appreciates MDT providing information on its permitting requirements and contact information for work within the right-of-way. EPA is requesting that the Custodial Trust include the MDT permitting requirements referenced above in Section 7 of the Interim Measures Work Plan 2013.

- The proposed placement at excavated material adjacent to MT 518 is a concern to MDT. The prevailing winds are from the west and this could result in a public hazard. Please provide information on the methods for preventing blowing dust that may impact the traveling public on MT 518.

EPA Response: All construction contract documents will include requirements for the implementation of best management practices to prevent migration of soil particles from any work or stockpile area, including dust suppression, storm-water runoff controls, decontamination of all vehicles before leaving the work area and entering public roadways, and the use of temporary covers and silt fences around stockpiles.

- Stormwater runoff from the work within the Former ASARCO East Helena Facility cannot add additional flows to the MDT right-at-way beyond pre-existing conditions. Please contact Kevin Millhouse, Helena Maintenance Superintendent (406-444-6399) if additional flow is anticipated into MDT right-at-way.

EPA Response: No stormwater will be allowed to leave work areas at the East Helena Facility; therefore stormwater in excess of current conditions will not be allowed to flow to public rights-of-way. Thank you for the contact information.

Thank you for the opportunity to comment on the Interim Measures Work Plan. It you have any questions concerning MDT staff comments, please contact me at (406)444-9456 or email at jriley@mt.gov.

EPA Response: Thank you for taking the time to review and respond to the 2013 Interim Measures Work Plan and for the MDOT contact information.

Sincerely,

Jean A. Riley, P. E.
Transportation Planning Engineer
Policy, Program & Performance Analysis Bureau

Copies: Jeff Ebert - Butte District Administrator
Kam Wrigg - Butte Maintenance Chief
Kevin Millhouse - Helena Maintenance Superintendent
Jim Skinner - Policy, Program & Performance Analysis Bureau Chief
Mike Tierney - Policy, Program & Performance Analysis BureauFile

1/30/2013 EPA RESPONSE TO THE MONTANA FISH WILDLIFE AND PARK'S COMMENTS ON THE *FORMER ASARCO EAST HELENA FACILITY INTERIM MEASURES WORK PLAN – 2013*

December 7, 2012

PO Box 200701
930 Custer Ave W
Helena, MT 59620

Betsy Burns
Montana Environmental Trust Group
PO Box 1230
East Helena, MT 59635

Dear Ms. Burns,

Montana Department of Fish, Wildlife & Parks has reviewed the Draft Former ASARCO East Helena Facility Interim Measures Work Plan—2013. FWP supports the measures proposed in the work plan, particularly where they relate to construction of a bypass channel and ultimately removal of the smelter dam and rehabilitation of Prickly Pear Creek.

The natural function of Prickly Pear Creek has been significantly impacted by operations at the former ASARCO smelter. We feel that removal of the smelter dam and rehabilitation of Prickly Pear Creek will not only improve both migratory and resident fisheries, but will improve water quality by promoting vegetation in the riparian corridor. Restoring Prickly Pear Creek to a condition similar to pre-smelter will promote a functioning stream corridor that will more efficiently convey water and sediments, but will also better connect the stream to the floodplain, which will reduce impacts to surrounding areas during flood events. Moving the stream away from the slag pile will also reduce further introduction of foreign materials (slag) into the stream and will provide a safer environment for recreateors to use the stream.

FWP understands that the proposed 2013 measures propose only to construct the bypass channel so other hydraulic controls and mitigation actions can be implemented. We feel the negative effects of this temporary action are outweighed by the positive benefits of removing smelter dam and restoring the natural function of Prickly Pear Creek.

Thank you for the opportunity to comment on this proposal. FWP would also appreciate the opportunity to participate in the final design of Prickly Pear Creek to determine ultimately how Prickly Pear Creek will look and function.

Sincerely,

Eric Roberts
Helena Area Fish Biologist

EPA Response: Thank you for taking the time to review and respond to the 2013 Interim Measures Work Plan. EPA appreciates your support of the proposed 2013 measures and will ensure that the Custodial Trust engages FWP during final design of the Prickly Pear Creek realignment.

1/30/2013 EPA RESPONSE TO THE EAST HELENA SCHOOL DISTRICT'S COMMENTS ON THE *FORMER ASARCO EAST HELENA FACILITY INTERIM MEASURES WORK PLAN – 2013*

From: Ron Whitmoyer <RWhitmoyer@ehps.k12.mt.us>
To: Betsy Burns/MO/R8/USEPA/US@EPA
Cc: "mayorstrainer@gmail.com" <mayorstrainer@gmail.com>, Cynthia Brooks <cb@g-etg.com>
Date: 12/06/2012 09:59 AM
Subject: Interim Measures Comments from Ron

Betsy,

Thank you for the opportunity to give a perspective on the Interim Measures Work Plan. I appreciate the opportunity to have had METG review their work and the conceptual plans of what the future may bring to our community. I will try to keep my comments brief.

First, the geology and hydrology of the site make sense as Jim has described. Indeed reducing the amount and level of water seeping through the ground under the former plant site makes sense and the need to reduce that hydrological pressure in the contamination zone is important. I would suggest that further consideration to sampling and chemical or physical barriers to the identified sources of the selenium and arsenic seepage be evaluated for additional treatment.

EPA Response: As noted in section 2.2 of the 2013 Interim Measure Work Plan, several technical evaluations are currently underway to further evaluate the need for and feasibility of source removal actions. Additionally, the scope and environmental benefit of source control, source containment and removal actions are being evaluated as part of the Corrective Measures Study being developed by the Custodial Trust.

As for the ET Cover system and the expenses associated with the construction of the ET system… I wonder if any consideration has been given to not removing the CSHB and/or the OSHB to actually make them a part of the ET system since their floors are already impermeable barriers to contamination. Demolition of those concrete floors seems counterintuitive when you are considering replacing them with a synthetic plastic type product that has rip and tear potential. Could the floors actually become an incorporated part of the ET cover with more durability than a polymer material? The use of Trust funds to demolish these existing concrete floor barriers and then replace them with a less permanent material seems wasteful.

As an extension of the ET system plans and the site reclamation/repurposing I would also suggest that if good will is a consideration, and the need to move the rodeo grounds is also a concern, it might be worth considering turning the OSHB over to the EH Rodeo Committee. Again the savings to the Trust funds for demolition of that facility and the repurposing of the area to being useful to the community would be phenomenal. The EH Rodeo Association would be the envy of the entire nation for its indoor facility. And of course the amount of funds already expended to clean that building repeatedly would be considered thoughtful instead of a waste of trust funds. Since the conceptual plans for redevelopment include an indoor facility including athletic fields, wouldn't repurposing be far superior to demolition and then construction of a huge facility that would cost millions that this community could never afford?

EPA Response: EPA appreciates these comments from the East Helena School District. However, we note that, as part of the Interim Measures design activities, as well as the redevelopment planning studies, the Custodial Trust evaluated a number of potential options for the reuse of the OSHB. Unfortunately, the configuration and size of the internal concrete storage bins (that are constructed as part of the OSHB structure) preclude future reuse of the building for most uses. The absence of utilities and/or an operating ventilation system also make reuse a challenge. (The one possible exception was refurbishment of the OSHB for use as a waste transfer station, in order to leverage building size, concrete bins and overhead crane; however, poor economics and the lack of regulatory incentives for a recycling facility of that size ruled out this option.) EPA believes that the ET cover as proposed and described in the workplans provides for sustainable long-term protection. Therefore, demolition of these structures was proposed and approved as part of the Interim Measures Work Plan for 2012.

As always I'm more than happy to discuss any of these thoughts and be an advocate for the thoughtful cleanup and repurposing of the Trust property for the betterment and improvement of the City of East Helena.

EPA Response: Thank you for taking the time to review and respond to the 2013 Interim Measures Work Plan.

Thanks.

Ron Whitmoyer
Superintendent
East Helena Schools
P.O. Box 1280
East Helena, MT 59635
(406) 227-7700
(406) 227-5534 fax

1/30/2013 EPA RESPONSE TO THE STATE OF MONTANA'S COMMENTS ON THE *FORMER ASARCO EAST HELENA FACILITY INTERIM MEASURES WORK PLAN – 2013*

December 7, 2012

Betsy Burns
Remedial Project Manager
US Environmental Protection Agency
10 W 15th Street, Suite 3200
Helena, MT 59601

Montana Environmental Trust Group, LLC (METG)
c/o Greenfield Environmental Trust Group, Inc.
Cynthia Brooks, President
44 Shattuck Road
Watertown, MA 02472

RE: Montana's Comments on Draft for Public Review Former ASARCO East Helena Facility Interim Measures Work Plan -2013, dated November 7, 2012

Dear Ms. Burns and Ms. Brooks:
The State of Montana, through the Montana Department of Justice and Department of Environmental Quality, is submitting the following comments on the Draft Former ASARCO East Helena Facility Interim Measures Work Plan-2013 (2013 IMWP), submitted to the State by the Montana Environmental Trust Group, dated November 7, 2012.

At the outset, it should be noted that recently the State submitted a request to the Trust for copies of documents that the State has a right to under the Trust agreements governing these matters. Subsequently, we received a response, which, in our view, was unsatisfactory. The documents requested include detailed financial statements of past Trust expenditures, the detailed proposed budget for the 2013 IMWP, and the project management contracts with CH2M Hill. The State pointed out that its receipt and careful review of the documents requested is necessary in order for Montana to provide knowledgeable and meaningful comments and otherwise consult with the Trustee and EPA on the 2013 IMWP. Given that it is estimated that the cost of the 2013 interim measures (IMs) may be in the neighborhood of $20 million and that there has been no corrective measures study completed that would set forth an actual plan for clean-up of the site, it is imperative that the State fully understand how the Trust is currently expending its money, how its money will be expended in 2013, and how these multi-million dollar IM projects will be managed. A prime consideration in any clean-up project is cost-effectiveness and cost-benefit. Without these documents, Montana is unable to effectively evaluate these critical factors, although it is one of the two Beneficiaries of the Trust fund that is being consumed by these IMs and the planning for them.

EPA Response: As you are aware, the 2013 interim measures are significant parts of a series of interim measures the Custodial Trust has proposed be conducted as early as practicable. This, of course, means that the measures are proposed to be conducted in advance of the completion of the Corrective Measures Study (CMS). And, as we have explained to MDOJ multiple times, the CMS will fully account for all the data generated by installation and implementation of any approved interim measures.

Because EPA believes the proposed interim measures will have immediate and long-lasting environmental benefit, and because they can be integrated into any other final remedies selected at the end of the CMS, EPA has conceptually concluded that it is appropriate to conduct the proposed interim measures, and, in particular the interim measures proposed to be conducted by the Custodial Trust in 2013.

EPA and the Custodial Trust regularly describe in detail to the State and other interested persons the legal framework for approaching corrective measures this way, the technical basis for the Custodial Trust's proposal, and EPA's conceptual support for this proposed approach. EPA and the Custodial Trust's informal and formal presentations to the State often include detailed discussions of how these particular interim measures can and likely are to be integrated into any final remedies that are likely to be selected at the end of the CMS. It is worth noting again that it is a quite reasonable expectation of the Custodial Trust and EPA that these interim measures will provide immediate environmental benefits while the CMS is being conducted.

We also note that EPA has heard and been responsive to the input of the State (as well as the rest of the public) on the comprehensive set of proposed interim measures, both during our regular informal communications with the State, and during the formal consultation period. One example is that, based in large part on the State's input, EPA has recommended that the Custodial Trust phase the large set of proposed interim measures over a series of years, and propose specific interim measures in separate discrete work plans for each year major work is to be performed. This allows for regular, ongoing analysis and input from the State, and the rest of the public, on each potential interim measure. This approach also allows EPA (and the Custodial Trust) to re-evaluate its approach, schedule and sequence for the work on a regular basis.

Regarding the State's feeling that it received an unsatisfactory response to its ongoing document request, as an initial matter, EPA questions the State's assertion that it cannot provide meaningful comments on the 2013 IMWP without performing a detailed review of all private contracts, contractor invoices, and individual compensation packages of the contractors and consultants of the Custodial Trust, especially since the State's December 7, 2012 comment letter clearly provides meaningful comments on the 2013 IMWP.

For close to 20 years EPA worked closely with the Montana Department of Environmental Quality (MDEQ) on corrective action and other remedial activities at the former ASARCO smelter. Not once did EPA or MDEQ believe it was necessary to understand ASARCO's contracting relationship with it's contractors, captive or not, in order to fully assess whether a proposed interim or other measure was reasonably priced, or cost effective, or whether an interim measure could or would be effective for its intended purpose, or whether it might be capable of being integrated into any final remedy selected. If ASARCO had argued that any particular activity was too expensive, EPA and MDEQ would have requested information about ASARCO's total cost projections and enough supporting information to determine whether the projection provided was accurate, or not. EPA would then determine whether the cost projection was within a range EPA would expect based on its experience. If not, we'd argue with ASARCO about their projection. If it was within range, we would have analyzed whether the cost factor should tip the decision one way or the other. This is one precise purpose of the annual budgeting exercise the Trust is required to conduct for every sub-account, including the primary East Helena cleanup account.

In direct response to your assertion that the response to your document request was inadequate EPA notes that during meetings on 10/3/2012, 10/16/2012, 11/15/2012 and 12/06/2012, EPA and the Custodial Trust shared with the beneficiaries, including the State of Montana, the detailed information and data requested by the State. EPA and the Custodial Trust have also offered multiple times to meet with the State and provide direct access to any and all documents requested by the State, including the contracts between the Custodial Trust and CH2M Hill. Because we do not believe it is necessary under these site specific circumstances for us to thoroughly implement our responsibilities as lead agency for East Helena (or for the State to implement its consultation responsibilities), EPA has not requested and the Custodial Trust has not provided for MDOJ's possession certain detailed documents requested by the State, which include private contracts, information about personnel compensation and other confidential business information.

Although its beneficiaries are public agencies, the Custodial Trust is not itself a governmental agency or entity. Rather, as set forth in the Settlement Agreement, the Custodial Trust is a private trust charged with the cleanup, ownership and management of the Montana sites albeit under the continuing jurisdiction of the United States Bankruptcy Court for the Southern District of Texas. Notwithstanding its private status, we understand that the Custodial Trust has and continues to offer MDOJ the opportunity to examine, at any reasonable time, any and all documents and/or other information related to East Helena Environmental Actions. EPA believes that this is a reasonable solution which protects CBI information which if made public could increase the cost of cleanup.

Finally, we note that this matter again was discussed at a meeting attended by the State, EPA, and the USDOJ, on December 20, 2012 (after the date of the letter EPA is responding to herein). We refer you to our letter of [January 15, 2013], which addresses the specific matters discussed during that session.

Specific Comments

1. **Inadequacy of Interim Measures Process**. The State maintains, as it has in the past, that the breath of the proposed interim measures, including those planned for the years 2014-2015, requires that those measures be developed through a conventional RCRA Corrective Measures Study (CMS). The State is concerned that the IM implementation schedule will lead to a CMS analysis that is non-substantive in nature and merely endorses the IMs that are already in place or on the table, as the IMs will already be implemented, at least to a large degree, by that time, and are of a permanent nature.

   EPA Response: EPA acknowledges the State's previously stated position on Interim Measures and the Corrective Measures Study processes (see Montana Comments on IM Work Plan – Conceptual Overview of Proposed Interim Measures and Details of 2012 Activities – dated July 16, 2012). EPA would like to reiterate that the IM approach being proposed for the East Helena Facility is protective of human health and the environment, will make tangible progress towards reducing the effects of contaminant migration from the former Smelter Site to the surrounding community while final cleanup evaluations and decisions are being made, and is compliant and consistent with the First Modification to the 1998 Consent Decree (1998 CD) as well as the RCRA Corrective Action program (see EPA Response to Comments on Final Draft Former ASARCO East Helena Facility Interim Measures Work Plan – Conceptual Overview of Proposed Interim Measures and Details of 2012 Activities – dated August 29, 2012). Specifically:

a. Implementation of the proposed Interim Measures will immediately, permanently and sustainably reduce the migration of contaminants in groundwater from the former Smelter Site;

b. This use of the IM process is consistent with EPA's intentions, and EPA's support of the use of interim measures to "stabilize sites" can be found in the 1998 CD, and throughout RCRA regulations and guidance including the RCRA Corrective Action Plan (EPA, May 1994) and the ANPR;

c. The performance of the IMs will be evaluated as part of the CMS process, and the need for and scope of additional corrective measures will be identified at that time. The technical evaluations of the IMs will meet all the requirements for remedy evaluation specified in the 1998 CD and all other RCRA requirements.

d. RCRA Corrective Action regulations and guidance also clearly state that IMs should be designed to be consistent with, if not a part of, final remedies. The IM concepts, which were proposed by the Custodial Trust and approved in concept by EPA in the Interim Measures Work Plan 2012, are intended to function as permanent remedies and are expected to be a significant portion of the final remedy for the East Helena Facility.

Development of the IM approach and design basis have been carefully considered for each IM proposed for 2013. During the course of developing the IMs, the State has had the opportunity to review and comment on the drafts prepared for these measures, and during many, if not most, of the regularly held beneficiary meetings and other technical meetings the State legal and technical representative have been updated on the Custodial Trust's latest information and thinking.

Your comment that "the IM implementation schedule will lead to a CMS analysis that is non-substantive in nature and merely endorses the IMs that are already in place or on the table, as the IMs will already be implemented, at least to a large degree, by that time, and are of a permanent nature" is noted. EPA will ensure that the CMS process maintains its integrity. We also note that EPA continuously invites the State to participate in every technical activity, including workplan development and review, whether or not the State elects to participate. (EPA does note that, unlike EPA, MDEQ or USFWS, MDOJ has appointed its own representative on the technical design team for the PPC realignment work.). EPA will continue to keep the State appraised during our regularly scheduled meetings and at other major points in the process. And, EPA remains committed to consulting with the State informally, and during formal consultation periods. The State is welcome to stay vigilant regarding the CMS process, and we will welcome input on the CMS as the CMS process moves along.

2. **ET Cover and CAMU #3 Interim Measures**. For example, the State believes further details and analysis are necessary for the nearly site-wide ET Cover System IM and the Source Removal IM, including the CAMU #3 and its proposed location at the Lower Ore Storage Area (LOSA). The State maintains that an independent CMS should be developed now that fully analyzes all reasonable RCRA alternatives. Given the cost estimates presented to the Beneficiaries, the uncertainty about what contaminated soil will be removed, and the need to update or replace the wastewater treatment plant to meet the 2015 effluent limits, the State believes that implementing many of the IMs proposed for 2013 and thereafter without further consideration may be imprudent. The State encourages a thoughtful and deliberative approach to the RCRA corrective action process. The State

continues to advocate that a CMS should be developed now to perform a holistic remedy evaluation and analysis of reasonable alternatives.

EPA Response:

> The CMS process is going on now (with the State actively participating in review and development of the draft CMS Work Plan – December 27, 2011), and has been underway at the East Helena Facility since 2010. Refinement of conceptual site models for the former Smelter Site, evaluation of source removal feasibility and environmental benefits, evaluation of the proposed IMs, and the need for a third CAMU are currently underway and the results will be available to inform the design of the SPHC IM components, the ET Cover System, soil removal actions, and HDS Plant actions. This information, as all other information developed by the Custodial Trust under the CMS process, will be made available to the Beneficiaries as well as the public once the evaluations are complete.

3. **Off-site Groundwater Plumes**. As another example of what needs to be considered in a CMS is a clear, unbiased discussion and analysis of the measurable impacts to the current off-site plumes from the proposed IMs. The State believes the impacts must be clearly stated and METG and EPA should clarify if any off-site plume remediation is contemplated. Both the State and the United States based a significant part of their claims on the perceived need to remediate and restore the off-site groundwater plumes, yet there has been no consideration of such an action by METG up to this point in time. Implementation of the IMs that are on the table, with their huge costs, may, in effect, eliminate the possibility of remediating and restoring the groundwater under the City of East Helena.

   EPA Response: The draft IMWP contains a clear and unbiased discussion of the measurable impacts to the current on and off-site inorganic contaminant plumes from the proposed IM's. To put it simply, contamination has migrated from the smelter. The IM's will significantly reduce the FUTURE migration of contamination from the smelter. All of the technical evaluations performed to date indicate that implementation of the IMs will result in a significant reduction in the contamination that continues to migrate off-site in groundwater plumes. The draft IMWP is also clear that the Custodial Trust is currently focusing on IMs that reduce the: (1) volume of inorganic contaminated groundwater leaving the site and (2) inorganic concentrations within that groundwater. Additional remediation of off-site groundwater contamination will be evaluated during the CMS and will include an analysis of the risks associated with the then current off-site contaminated groundwater. At present we can reasonably expect to require implementation of additional IMs or actions that will be implemented as final remedies, including, as a minimum, institutional control such as the City of East Helena's current well prohibition and the development of a Controlled Groundwater Area as regulated by the Montana Department of Natural Resources.

   The State of Montana's technical analyses by William Bucher (April 10, 2009) and Ann Maest (April 20, 2009), which was developed to support the State's natural resources damages claim in the ASARCO bankruptcy did not include any remediation or restoration of off-site contaminated groundwater. Ms. Maest recommended a pump-and-treatment system on the northern boundary of the Facility. Pump-and-treatment is a proven **containment** technology for inorganic contamination but such a system would be required to be operated forever and, as conceptualized by your NRD expert would not have addressed the off-site arsenic source material, off-site arsenic plume or the selenium plume that has already migrated off-site. If during the CMS it is determined that a pump-and-treat system was necessary as part of the final remedy, the already-measured effectiveness of South Plant Hydraulic Control (SPHC) would aid in its efficiency and dramatically decrease the costs of its operation by reducing the amount of water requiring pumping and treatment and reducing the concentration of the contaminated groundwater, which also would result in reduced treatment costs.

Mr. Bucher estimated the total construction, O&M, and ancillary costs at $77.5M (April 2009 value) for the pump-and-treatment option of the "arsenic plume exceeding the MCL…" using reverse osmoses assuming up to 500 gallons per minute (gpm) flow rate. First, it should be noted that treatment of the contaminated groundwater to the MCL will not "restore" the water to background conditions. Restoration of the impacted groundwater was not even quantified in the analysis. The analysis assumed that 85% of the water would be discharged to down-gradient infiltration galleries and 15% to approximately 50-acres of HDPE lined and netted (prevent wildlife access) evaporation ponds within 2,700ft of the Facility. The $77.5M estimate did not include estimates for Selenium treatment, treatment plant replacement, or changes to effluent limitations all of which would increase the costs.

The W. Bucher analysis does say that "Because groundwater treatment will be more effective and eventually less expensive if some of the primary contaminant sources are remove from the site..". The combination of SPHC and the Evapotranspiration (ET) Cover System IMs are the most cost effective methods for removing soil contaminant sources to groundwater while also providing for removal of Smelter Dam and restoring the natural functions of Prickly Pear Creek (see, for example, Montana Fish Wildlife & Parks December 7, 2012 comment letter).

4. **Wastewater Treatment Plant**. METG mentions in several locations in the 2013 Work Plan upgrading or replacing the HDS (high density sludge) plant, for example on page 2-1. It was the State's understanding that METG's and EPA's justification for some of the haste for the 2013 IMs and the other proposed IMs was completing work before modifications to the existing plant or a new wastewater treatment plant are necessary. If a modified or new plant is not necessary, the argument for this haste is weakened. To better understand the path forward, METG should provide further explanation of the schedule and projected cost for upgrading or replacing the HDS plant, together with a clear explanation of why the current effluent limits cannot be temporarily extended past 2015.

   EPA Response: EPA acknowledges that one of the goals of the original project schedule was to implement IMs in time to obviate the need for upgrades to the on-site HDS wastewater treatment plant and to eliminate the ~$300k it costs to operate the HDS system each year. However, it was not the only factor and is being reconsidered as part of the technical evaluations being done to ensure the proposed IMs are protective, effective and cost-effective. One of the benefits of the ET Cover System will be to eliminate the need to collect and treat stormwater, thereby eliminating the need for the HDS plant. Evaluations of the ET Cover System implementation phasing suggest that it may be prudent to maintain the HDS system temporarily and that there may be cost-effective methods for keeping the plant operational for a limited time. Additionally, the Custodial Trust is reviewing the requirements for managing leachate collected from the two existing CAMUs. These evaluations are underway, including discussions with the State of Montana regarding the potential for obtaining a variance to the changes in effluent limits which are set to go into effect in 2015 (and would require significant upgrades to the existing HDS plant to meet the new MPDES discharge permit standards). Because the information was beyond the scope of work being proposed in the 2013 IMWP, it was not included in the subject document. In addition to including the State in ongoing technical discussions and reviews on this issue, EPA will request that the Custodial Trust provide appropriate supporting information regarding the HDS plant to the Beneficiaries at such time as the evaluations are almost complete and a decision regarding the HDS plant is being proposed.

5. **Section 1, Introduction**. The 2013 IM Work Plan states additional technical details will be provided to EPA under separate cover to support EPA's review and designation of the CAMU #3. Without additional information in the IM Work Plan on the design, the State cannot make a determination on the suitableness of the CAMU or the location. The State reserves comments on these issues until METG and EPA present additional design information for public comment.

   EPA Response: As stated in the Introduction, the Custodial Trust is not requesting that EPA or the State of Montana make any determination on the need for, suitableness, or location of a third CAMU based on the Interim Measures Work Plan 2013. The CAMU information provided was because EPA committed to providing the CAMU-LOSA siting analysis in its response to comments on the 2012 IMWP.

6. **Soil Sampling and Consideration**. A discussion of soil sampling efforts and schedule for source removal decisions would be helpful. A soil sampling regime of the upper few feet of soils, post demolition, should be done to determine if consolidation of upper soils could in fact reduce the size of the ET cap.

   EPA Response: EPA notes that the information requested by this comment is outside the scope of the proposed 2013 interim measures work and therefore not part of the work plan. However, technical evaluations of the need for and environmental benefits of source removal are currently under way as part of the CMS process and will be completed, and shared with the State, with sufficient time to inform the ET Cover System design and other IM and CMS decisions. These evaluations will include updated conceptual models of the former Smelter Site and describe the basis for the proposed ET Cover system boundaries based on the data to be gathered when combined with the considerable data set that exists for onsite soils.

7. **Section 3, Updated Conceptual Site Model**. The EPA Soil Screening Levels are referenced in this section. The reference notation appears to be the 2010 values. However, Section 9 References appears to reference the April 2012 revisions. The State suspects the Phase 2 RFI Report has not been updated to reflect the 2012 EPA Regional Screening Levels. This may be a point of confusion for other reviewers and should be clarified.

   EPA Response: Page 3-1 states that the 2012 EPA screening values were used in the updated conceptual site model evaluations to indicate that the most current EPA values were used to screen data presented in the draft Phase 2 RFI Report (GSI, 2011). The draft Phase 2 RFI Report will not be updated with data developed after 2011 – new data will be presented as appropriate in other technical memoranda and reports.

8. **Section 6.2.1, PPC Temporary Bypass**. The Work Plan states that soils with concentrations of COPCs exceeding appropriate media cleanup standards will not be used as growth media for the ET cap. When will soil reuse standards be established and in what process, for example, would that be in the 2014 IM Work Plan? Will there be enough soil from PPC construction that will be protective and meet reuse values? What will be the testing frequency used? The State believes hazardous constituent levels that are protective of human health and the environment must be established for material that will be used as part of the ET cap.

   EPA Response:

a. Soil re-use standards will be based on the soil media cleanup standards protective of human health and the environment, and will be proposed for the East Helena Facility in 2014. Development of remedy performance criteria and media cleanup objectives is part of the overall CMS process, currently planned for the first half of 2014, and will be documented in a technical memorandum that will be incorporated into the overall CMS Report.

b. Construction of the PPC Temporary Bypass will not generate the volume of fill or growth media material currently estimated to be needed for construction of the ET Cover System. The PPC realignment work is expected to generate additional materials, and there may be a need to import material from off-site if material of sufficient quality and volume is not available on-site. These evaluations are being conducted as part of the design of the ET Cover System, and will be presented in future IMWPs.

c. Soil testing frequencies have not been finalized at this time, but will be established to provide representative sample results and appropriate levels of protectiveness given the material's intended use. In other words, materials intended for use as fill below the ET Cover System may not be sampled because they will not be in direct contact with human or ecological receptors, the soils will not be in contact with groundwater, and the potential for leaching will be minimal because the ET Cover System will essentially stop infiltration.

9. **Section 7.2.1, PPC Realignment**. The State understands that METG plans to move forward with the costly design of a realigned PPC as part of the 2013 IMWP. (Also see Section 5.2.4.) For the numerous reasons set forth in Doug Martin's memorandum, Attachment A, hereto, which is incorporated herein by reference, the State believes that this design work would be premature and should wait at least until 2014.

   EPA Response: Please see the responses to Doug Martin's memorandum, provided in the following section of this Response to Public Comments on Interim Measures Work Plan 2013.

10. **Appendix A, Drawdown Test**. On page 3, three objectives are listed for the drawdown test. What is the schedule for completion of the listed objectives?

   EPA Response: Objective1, quantifying the Plant Site groundwater level response to lowering the Upper Lake level, has been fully met and addressed in the Upper Lake Drawdown Test Technical Memorandum (TM) (Hydrometrics, 2012). Objective 2, identifying potential preferential groundwater flow paths based on the groundwater level response to lake lowering, has also been met and addressed in part in the TM. Objective 3, refining plant site hydraulic conductivity values, will be completed after the recovery portion of the test is complete, if test data allows. The recovery period is expected to extend well into 2013. Objectives 2 and 3 are also being evaluated with the numerical groundwater flow model currently being developed by New Fields LLC.

11. **Appendix A, Alluvial Groundwater under Upper Lake**. On page 7, it is noted that underflow through the alluvial gravels underlying Upper Lake may persist even after permanent dewatering of Upper Lake. Does METG have an estimate of the volume of flow under the plant from the alluvial gravels? What is the schedule to evaluate this component and the impacts to any soil that remains after corrective measures implementation?

   EPA Response: EPA consulted with the Custodial Trust which has provided the following clarification, which EPA accepts - The potential post-SPHC groundwater flux originating from the current Upper Lake area has been estimated based on a simple Darcy flux calculation as follows:

   $Q = K*i*B*W$

where:

K (hydraulic conductivity) = 100 ft./day (typical of measured values for plant site alluvium);

B (saturated thickness) = 10 feet,

W (flow field width) = 1,000 feet,

I (hydraulic gradient) = 0.0087.

Based on these estimated values, the groundwater flux through the current Upper Lake area would be approximately 45 gpm. This value should be considered a preliminary estimate based on the assumed properties.

Regarding the schedule to further evaluate this flow component and potential impacts to soils remaining after corrective measures implementation, additional evaluation will be completed in early spring 2013. The evaluation will include aquifer testing to refine estimated hydraulic conductivity values, determination of alluvium thickness and hydraulic gradients, and will be detailed in the 2013 Field Sampling and Analysis Plan to be prepared in early 2013. The post-SPHC groundwater flux is also being evaluated through the numerical groundwater flow model currently in development.

12. **Appendix A, Need for More Data for SPHC**. Given the potential cost of implementing SPHC IM, the State wonders if there is sufficient data to ensure the effectiveness of SPHC. There may well be value in collecting additional information over a greater length of time and/or with Prickly Pear Creek lowered for an extended period. This issue is discussed in greater detail in Attachment A, hereto.

    EPA Response: EPA consulted with the Custodial Trust which has provided the following clarification, which EPA accepts – The Custodial Trust and EPA agree with the concept of collecting additional information and data during the period the bypass channel is in use. Although we feel that the Upper Lake Drawdown test has provided significant information for estimating post-SPHC plant site groundwater levels, as presented in Attachment A to the draft 2013 IMWP, diverting Prickly Pear Creek through the bypass channel for an extended period provides a great opportunity to verify and build on the drawdown test results. Since groundwater elevations are a key component of the IM planning and design, and a key component for final site remediation, groundwater level monitoring will continue into 2013 and beyond. The 35+ continuous recording water level transducers currently on site will be maintained throughout the IM program, including the bypass channel diversion period. The Custodial Trust also plans to install additional piezometers in the East Bench area to supplement the current groundwater level monitoring program. Information gained in 2013 will prove invaluable in addressing the questions raised in Attachment A to the comments. The piezometer installation and 2013 groundwater level monitoring program will be outlined in the 2013 Field Sampling and Analysis Plan to be prepared in early 2013.

13. **ET Cover System design, monitoring, and performance standards**. Site specific design and performance standards for the ET Cover System IM were not included in the 2012 or 2013 IM Work Plans. Capping may be presented as an interim measure, but the expectation of the IM Work Plans is that it will likely become a large portion of the site's final remedy. Therefore, the State maintains site-specific design information and performance standards should be included in a document available for public review and comment.

EPA Response: Site-specific design information and performance standards for the ET Cover System IM were not included in the 2012 or 2013 IMWPs because that work is not scheduled to occur until after 2013. This information will be provided in the IMWP for the appropriate construction year.

14. **Cost Information for the Public**. The State strongly maintains that the public must be informed of the general costs of each proposed interim measure and other elements of the budget for the 2013 IMWP and that such cost estimates should be included in the IM work plan. These estimated costs are essential for full and meaningful public input on the 2013 IMWP, and the IMs planned for 2014-15.

    EPA Response: As previously stated in the response to comments for the 2012 Interim Measures Work Plan, EPA disagrees. Cost information is not properly or appropriately included in a RCRA corrective action IMWP. Including such cost information would inaccurately suggest that EPA is seeking public comment on the estimated costs for the IMs.

    The purpose of an IMWP is to describe the objectives, scope and components of a proposed IM such that can be approved by the EPA, as Lead Agency, prior to implementation. The purpose of providing the IMWPs to the public for review and comment is to inform the public of proposed cleanup activities being done under RCRA and provide the opportunity for public participation.

15. **Contract Bidding Process**. The 2013 Interim Measures Work Plan should also provide, for both State and public consumption, a full and accurate description of the process by which the Custodial Trust will put out for bid the contracts that will be awarded by the Trust to implement the interim measures, including, for the year 2013, the demolition measures, and the Prickly Pear Bypass work. Montana has found that an open and transparent contract bid process is the most cost-effective way to get projects such as those proposed for 2013 implemented in a timely manner.

    EPA Response: EPA disagrees. Contracting information is not properly or appropriately included in a RCRA corrective action IMWP. Including such information would inaccurately suggest that EPA is seeking public comment on the contract mechanism for the IMs.

TO: Rob Collins

CC: Greg Mullen

FROM: Doug Martin

DATE: December 7, 2012

MEMORANDUM

SUBJECT: 2013 East Helena IMWP and Prickley Pear Creek (PPC) Realignment

As I understand it, the main goal of the new PPC channel design is that it not affect any of the work remediation is doing to lower the groundwater for the south plant hydraulic control (SPHC). It was stressed that the PPC realignment was not a restoration project but a means of meeting the remediation goals. The second goal is to design a channel that will be self-maintaining, resilient, transports sediment, vertically stable, etc.

EPA Response: The overall goals and objectives of the PPC Realignment are as follows:

- Support the implementation of the cleanup management strategy for the East Helena Smelter RCRA site;
- Reduce groundwater levels beneath the site (as part of the overall SPHC IM);
- Facilitate removal of Smelter Dam;
- Facilitate removal of Upper and Lower Lakes, and the Wilson Ditch point of diversion;
- Facilitate removal of contaminated soil within Tito Park/Lower Lake/Upper Ore Storage Area, and other adjacent areas (like the Acid Plant) as determined necessary and appropriate after completion of the already ongoing remediation evaluations;
- Facilitate stabilization of the slag pile;
- Provide for habitat restoration and/or replacement as needed to comply with natural resource (NR) protection permitting requirements for remediation work;
- Provide materials for use in other IM construction actions (such as ET Cover);
- Facilitate elimination of the HDS Plant discharge to PPC; and
- Help mitigate existing Facility flood risk from PPC.

For the channel itself, the goals identified in MDOJ's comment are applicable and appropriate. The overall goals and objectives have been presented in several documents including the Interim Measures Work Plans (2012 and 2013), technical memoranda (Upper Lake Drawdown Test; SPHC Preliminary Concept Plan), and other planning documents. In addition, both overall and channel-specific goals will be refined and incorporated into the PPC Realignment Engineering Report, which will be prepared for the design process documentation.

Apparently, the ultimate Tito Park removal actions are not known at this time and an option would be to remove some of the contamination within the Tito Park boundary to create more room for the new channel and floodplain. The Tito Park design and the contaminated material removal design is not complete so it was not possible to determine what the remediation constraints are that will affect the

PPC realignment design. This leaves a big question about how the PPC Realignment design can move forward.

EPA Response: Soil removal evaluations are being conducted for the entire site, including Tito Park, to determine the cost-benefit of any proposed actions on overall site remediation. Specifically the Custodial Trust is evaluating grading options for the Tito Park area for a range of alternatives - from complete removal of the Tito Park fill to minimum grading needed for installation of the PPC Realignment. These options are being evaluated in terms of degree of contaminant removal and resultant groundwater benefit versus the cost of implementation. This evaluation is being undertaken to coincide with preliminary engineering for the PPC Realignment.

Construction activities for bypass channel and the 2013 proposed demolition should move forward in 2013. The construction of the by-pass channel design does not have the uncertainties associated with it as does the rest of the remedial construction design currently being developed. The completion of the by-pass channel and the lowering of the water level will provide answers to many of the uncertainties or provide the opportunity to gather information needed to address uncertainties associated with both the SPHC and the PPC Realignment designs.

EPA Response: EPA agrees with this statement. Information gathered from implementation of the PPC Bypass channel in 2013 will be integrated with the design of the PPC Realignment as available, and used to verify the assumptions and approach. The design process for the PPC Realignment is ongoing, and will utilize the current and substantial volume of existing information and observations developed for the PPC, along with supplementary investigations to develop a long-term, sustainable creek hydrologic system.

The current PPC bypass channel design will carry the 25-year flood event and flows greater than the 25-year event will be diverted into the existing PPC channel, thus there is room for large flows. The design of the PPC bypass channel lowers the risk of downstream effects and dam failure to very manageable risk levels. The chance of a 25-year event occurring is less than 5%.

EPA Response: EPA agrees with these statements.

I recommend two activities: Construct the by-pass channel as designed to carry the design flows with the over flow into the existing channel. Upon completion of the bypass channel evaluate and assess groundwater drawdown effects for the remediation design and the PPC realignment design. Time and money are currently being expended on the SPHC and PPC realignment designs that are based on assumptions of what the groundwater elevations MAY BE upon dam removal. With construction of the bypass channel, gathering of information to answer many of the uncertainties associated with the remediation and PPC realignment designs will be possible.

EPA Response: EPA acknowledges that the design of the PPC realignment is based upon projected site-wide groundwater elevations that will occur once Smelter Dam is removed, Lower Lake is dewatered, and the ET Cover is in place. The Custodial Trust collected direct measurements of groundwater levels for approximately one year of eliminating standing water in Upper Lake and 2 months in which the standing water behind Smelter Dam was eliminated during the Upper Lake Drawdown Test. These direct measurements in monitoring wells adjacent to Smelter Dam provide a very good indication of groundwater elevations post Smelter Dam removal in this area.

EPA is confident that each of these IMs will have a significant beneficial (for cleanup purposes) effect on long-term groundwater elevations beneath the site, and in the vicinity of PPC. However, delay of the realignment design to accommodate these activities is not possible based upon the necessary sequencing of these IMs. If additional data and/or time are required to address uncertainties then the IM schedule will be appropriately modified in 2014 and beyond.

However, while empirical observation of these activities on site-wide groundwater are not entirely possible, the Custodial Trust is undertaking several design activities to refine our knowledge and develop more accurate predictions upon which to base the design. For example, the Upper Lake Drawdown Test provided key insight and quantification of the benefits and impacts of removing the Upper Lake water source from adjacent to the site. Groundwater measurements and projections made as a result of this testing confirm the benefit of SPHC IM approach and facilitate the PPC realignment design. Additionally, ongoing numeric groundwater modeling of the site based on this data and other investigative information will be used to further inform the design and help develop a more robust model of future conditions.

The design of the realignment and associated floodway riparian areas has significant flexibility to accommodate a fluctuating groundwater interface. This area is expected to be designed based on our projection of groundwater levels in the initial design, but the final planting and grading of the riparian zone can be adjusted or deferred until actual IM implementation is complete.

The current approach to PPC Realignment implementation envisions two separate phases: one north of Smelter Dam, and one south of Smelter Dam. The north reach will temporarily connect to the terminus of the PPC Bypass channel to dewater the existing creek downstream of Smelter Dam to facilitate the dam removal. The south reach will then be installed and connected to the north reach after sediment removal of materials upstream of Smelter Dam is completed in dewatered conditions. The construction timing of these phases is still being evaluated by the design team for implementation in 2014 and/or 2015.

Currently, there are many uncertainties that need to be dealt with to finalize designs at the site. Some of the uncertainties are unique to this this site because of the smelter dam. The uncertainties listed below will either be addressed or at the very least better understood after water elevation is lowered by placing PPC in the proposed by pass channel.

What will the groundwater elevation be? The information will be critical to all design decisions.

EPA Response: See previous responses above. Groundwater elevations were quantified and forecasted based on Upper Lake Drawdown Test results and numeric groundwater modeling efforts. Details on these quantification and elevation efforts are found in Appendix A of the 2013 IMWP.

How much of the contaminated material from Tito Park needs to be removed? If left in place is Tito Park out of 100-year floodplain?

EPA Response: The soil removal evaluation process as described above will determine how much of Tito Park (and adjacent areas) will be removed from the area.

What is the remedial design that will ultimately dictate what the PPC realignment channel needs to consider? If the PPC realignment is supporting the remediation design, then the PPC realignment team needs to know what the design is and they should not make assumptions about the remedial design. If the remedial design needs to change the PPC design would need to change.

EPA Response: IM design teams for PPC, groundwater, soil evaluations, and ET cover are integrated and working together to establish coordinated designs that result in a logical, properly sequenced execution of the IMs. EPA would also like to clarify the terminology, and use appropriate RCRA terms. Remedial Design is a component of CERCLA cleanup and is analogous to the Corrective Measures Implementation (CMI) in RCRA. Again, we note that EPA welcomes active participation in this ongoing effort by State technical staff.

What is the substrate beneath reservoir sediments? Will the available material be suitable for PPC realignment construction?

EPA Response: EPA consulted with the Custodial Trust, which has provided the following clarification, which EPA accepts. Numerous investigations have been completed within the proposed PPC realignment area including Upper Lake, Tito Park, Lower Lake, Upper Ore Storage, and the East Bench areas of the site. Materials encountered vary, but generally appear suitable for realignment development. Currently, the design team is evaluating subsurface data from investigations within the proposed PPC Realignment corridor. Additional data may be necessary in some areas of the realignment and if determined needed, supplementary investigations will be performed to support the design development.

What is the wetland mitigation acreage? What portion of Upper Lake will need to be mitigated?

EPA Response: The mitigation acreage is undetermined at this point and will be established based on consultation with the USACE during permit development for Joint Application #2 for the project. Again, EPA will welcome active participation by State technical staff on this aspect of the project. Even if the State continues to decline to participate at this level, the State and other beneficiaries will be consulted informally and formally at regular points during the process. EPA presently anticipates that the PPC Realignment will result in a net increase in functional value and riparian habitat for the creek.

What effect will the draw down have on the Upper Lake wetlands and does the PPC realignment need to be longer to create wetlands here or will springs occur to meet wetland requirements?

EPA Response: After drawdown, water sources to the riparian area of the PPC are expected to occur through:

- Ground and surface water recharge off of the west bench area;
- Stormwater runoff from the ET cover area;
- Overbank flows from the PPC; and
- Groundwater recharge from alluvial gravels beneath Upper Lake.

Currently it is thought that these water sources can sustain wide range of riparian habitat with a high degree of functional value.

If PPC placed in the east bank alluvium will PPC go dry due to groundwater elevations significantly below ground level?

EPA Response: Numeric groundwater modeling and analytical analyses are currently underway to support design development of the PPC Realignment, and to evaluate the impacts of the Bypass. Numeric groundwater modeling backed by measurements for the existing creek indicate that the PPC channel has both gaining and losing reaches through this section of the site. Preliminary results for the PPC Bypass indicate that similar conditions (both gaining and losing reaches) will seasonally occur for the bypass alignment. The final realignment design will be informed by the modeling and the channel elevation will be set to minimize the length of losing reaches.